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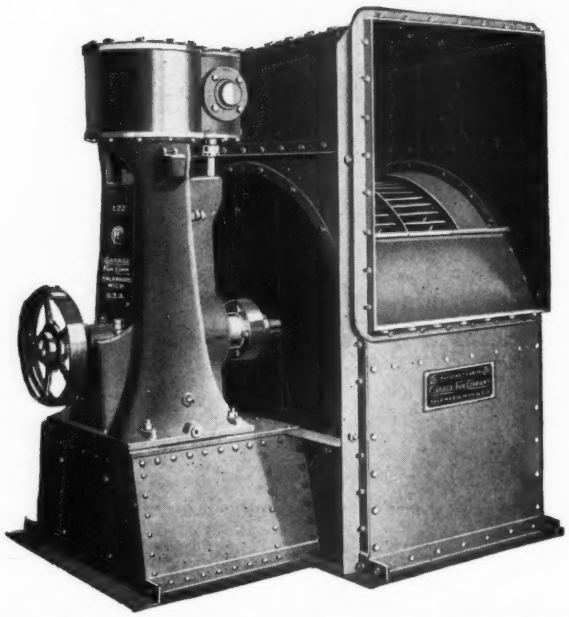

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THE HEATING AND VENTILATING MAGAZINE

JULY, 1919

GETTING THE HEAT TO THE CONSUMER

Basic Points in the Design of a Central Heating System, with Special Reference to the Distributing Lines.

BY HOWARD E. LONG.

The manufacture of the medium is according to commercial practice; the delivery (beyond the customers' valve) is according to the wishes of the purchaser, but the distribution is at the mercy of the distributing system, which, (being buried underground) must be self-sustaining, fool-proof, and efficient. To meet these three conditions, requires competent designing, high class manufacturing and careful installation.

The distributing system consists primarily of a pipe line from the source of supply to the place of delivery. This pipe line will expand and contract under variations of temperature, the amount of expansion and contraction depending upon the nature of the material, the size or quantity of it, and the temperature variations to which it will be subjected.

Fittings known as expansion devices must therefore be installed in the pipe line to accommodate this expansion and contraction, in order to prevent rupture of the pipe connections. Other devices, known as anchor fittings, must be installed to hold the pipe line rigid at certain predetermined points, and to control the movement of expansion and contraction toward, or away from, other predetermined points, and means must be provided to facilitate the expansive movement.

Means for making connections to customers' heating pipes must be provided at proper intervals; devices must be installed for shutting off various portions of the pipe line when desired; access to the connection points must be facilitated; changes in grade or alignment of the pipe line must be correctly executed and drips properly located, and last, but by no means least, loss of any of the heating medium, due to radiation, or leaks, into the surounding earth or air must be prevented.

For the pipe line, the writer recommends strictly wrought-iron line pipe, as this provides the best combination of durability and economy. Some other metals are more durable but their cost is prohibitive, while others are cheaper but their life is uneconomically brief under the chemical action of the heating medium.

FIGURING PIPE EXPANSION.

Authorities differ as to the exact amount which wrought-iron pipe will expand and contract under variations of temperature, but for this work it is well to use the factor: 0.00000686. This coefficient of expansion is the

amount that the pipe will expand per degree difference in temperature per foot of length. Suppose, for example, that a pipe line is to be installed in an outside temperature of 60° F., and that the greatest temperature of steam to be carried in the pipe line is 285°. Then the expansion per foot of line will be: (285°—60°) x 0.00000686 x 12 (inches) = 0.0185 in., or an expansion of 1.85 in. per 100 ft.

For the expansion devices, a design requiring no inspection or packing after installation is to be preferred. A typical device of this kind is constructed of heavy cast-iron parts, with movable slips connected to flexible copper diaphragms which in turn are reinforced with backing plates of wrought-iron. This may be enclosed in a covered box of masonry without a manhole. It is provided with anchorage to support its weight in the masonry and at the same time to prevent its movement under expansion of the pipe line, except through its slip and diaphragm.

In cases where connections to the main pipe line are required at infrequent intervals, or where the expense of repacking stuffing boxes or the presence of surface manhole covers is not objectionable, expansion joints with packed slips may be installed to accommodate expansion. These should be specially designed for this class of work, and provided with anchor saddles, and have extra deep stuffing boxes which take a greater amount of packing than the ordinary commercial expansion joint, and thus require packing at less frequent intervals.

For the anchor devices, desirable features are embodied in the anchor special, anchor cross, and anchor elbow. The first of these is of special design provided with anchorage similar to the expansion device just described. It is placed in the pipe line alternating with the expansion joint. It holds the pipe line rigid against movement due to expansion, insuring the expansive travel being accommodated by the expansion joint slips and diaphragms.

The anchor cross and anchor elbow serve the same purpose of rigidly anchoring the line, but are used at points where change in direction of the pipe line is desirable or necessary, as at a street intersection or to pass an obstruction. These fittings are provided with bases cast integral with the fittings, and to facilitate the flow of steam "around the corner" are made with long radius between the adjacent openings.

To facilitate the expansive movement, the pipe line is supported at frequent and proper intervals on roller or ball guides specially designed for this work, and to suit the insulation which is described later.

In high-pressure operation, weaving and temporary local distortion of the pipe due to the high temperature may occur. It may then be difficult to maintain proper alignment and parallel motion of the expansion joint slip through the stuffing-box. Leakage through the packing may result.

Alignment guides should be installed to overcome this tendency. These are castings of spool shape installed around the pipe, and carefully aligned relative to the pipe and to each other. They are then embedded in concrete to prevent their moving out of position. They are set in pairs, two to each expansion joint slip, one at a distance of 3 or 4 ft. and the other at a distance of 12 or 15 ft. They serve the same purpose as a guided expansion joint, but to much better advantage, because they guide the pipe for a distance of several feet from the joint, and absolutely elminate leverage at the joint.

SERVICE CONNECTIONS.

To permit making connections to customers' piping expansion joints and anchor special may be had provided with service connections near the top of the fittings, which are set at intervals of 40 to 50 ft., corresponding with the average width of city lots. The expansion joint should accommodate the expansion of this amount of pipe line under proper conditons of operating and test pressures and temperatures.

IMPORTANCE OF CONTROL FOR SHUTTING OFF PORTIONS OF PIPE LINE.

To provide for shutting off portions

of the pipe line when required for making service connections, gate valves, specially designed for this work, are installed in an accessible manhole. They should be of the so called "packless" type, non-leaking when full open or full closed, but provided with a small stuffing box for packing, to prevent slight leakage during the process of opening or closing. They should be constructed with rising gates which when open are above the pipe orifice, in order to leave unrestricted the full area of the pipe line.

GRADE AND ALIGNMENT.

Changes in grade or alignment of the pipe line may be made by means of adjustable wedges set between anchor fittings and their companion flanges, or by means of angle joints, composed of two halves revolvable upon each other up to the limit of offset of 45° or 90° as required. Both the adjustable wedge and the angle joint are provided with male and female connection, to hold the halves in proper relative positions, during the process of setting to the desired offset.

DRIPS.

Where abrupt changes in grade are necessary, and low points in the line result, steam traps should be installed in manholes, offering access for inspection. These traps automatically drain off condensation from the line and prevent "water-hammer." They should be simple in construction and operation, and easy to inspect and clean.

INSULATION.

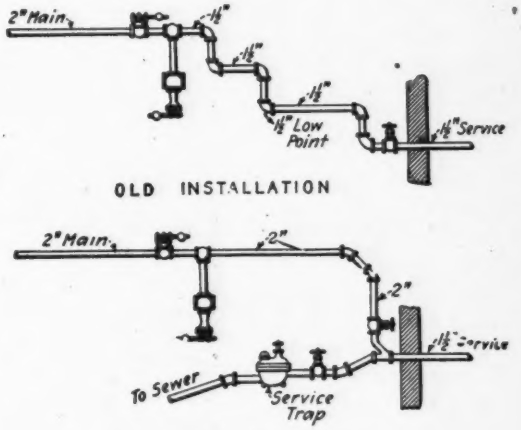
To prevent loss of the heating medium due to radiation of heat into the surrounding earth or air, the entire pipe line should be encased in an insulating conduit, having the highest possible efficiency, consistent with economy of price, and durability.

The use of the devices such as those here described, and the utilization of a high standard of design, manufacture, and installation will insure a durable, efficient, and profitable distributing system, in all cases where the type of management is comparable with the system as installed.

Correcting Service Connections on a Central Heating System.

The accompanying illustrations show a condition and the manner in which it was corrected in regard to a service connection that was not supplying sufficient steam heat. This particular installation is reported by W. H. Frehsee, of the Harrisburgh Light & Power Company, who states that he has found as many as seven 90° ells in a single service connection.

The installation was changed as indicated, with 45° angles and Y connections. Mr. Frehsee states that it is now the com-



CORRECTING HEATING SERVICE CONNECTIONS.

pany's practice to insist that the service connections be not less than 2½ in. in diameter, regardless of the small size of a building, as all pipe above 2 in. has larger threads and more weight than the smaller sizes. Another reason the company insists on large service is to overcome friction and pressure by having sufficient area and volume. The sizes of services recommended for 1 lb. pressure are as follows:

Size service connection, inches diam.	Radiation, Square Feet.
2½	600
3	900
4	2200
5	3600
6	6000

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

RESEARCH BUREAU THE MECCA OF THE HEATING ENGINEERS AT THEIR MID-SUMMER MEETING

An event of historic importance to the heating and ventilating industry took place during the mid-summer meeting of the American Society of Heating and Ventilating Engineers, in Pittsburgh, Pa., June 10-12, when the third session of the meeting was called to order by President Walter S. Timmis, in the building of the United States Bureau of Mines, in that city. It marked what was virtually the inauguration of the Bureau of Research of the heating engineers' society and, at the same time, the entry of the society into partnership, with the government in the important experimental work about to be undertaken by the bureau. That this partnership is more than nominal may be seen from the fact mentioned by J. Irvine Lyle, chairman of the Research Committee, that the government's contribution, in the form of equipment, services of assistants and operating facilities, will duplicate the society's research fund up to no less than $25,000 per year. As the society has already reached a subscription total of $18,000 per year for the five-year period, this means that the bureau will have available the equivalent of at least $43,000 per year with which to begin its work.

PRESIDENT WALTER S. TIMMIS,
Who Presided at the Summer Meeting of the Heating Engineers' Society.

The significance of the occasion was not lost upon those in attendance and when Director John R. Allen rose to say a word for the bureau it was taken as a formal inauguration of the great work and the convention as a body rose to its feet and proclaimed Professor Allen with prolonged applause.

The meeting was also remarkable in bringing together for the first time, in joint session, the American Society of Heating and Ventilating Engineers and the National District Heating Association. The cordial expressions of President Timmis in addressing the district heating engineers reflected a feeling of good fellowship and a desire to co-operate that can hardly fail to have important results in the work of both associations.

Morning Session, June 10.

President Timmis presided at the opening meeting which was held in the William Penn Hotel, Tuesday morning, June 10. The society was welcomed to Pittsburgh by Professor Barnes of the

Carnegie Institute of Technology. President Timmis responded and then presented his address.

President's Address.

Mr. Timmis referred first to the vigorous growth of the society since its meeting in June of last year in Buffalo.

"Prominent, of course," he said, "in the achievements of the year is the founding, upon a bed-rock foundation, of our Bureau of Research. The Committee on Research Bureau, under the masterful leadership of J. I. Lyle, has nailed the colors of our society at the masthead so that they will act as a beacon for other and larger societies to follow. We are already discovered by our big brothers and we are being watched and congratulated upon the progress thus far made. We are blazing the trail and preparing for the day when a greater movement will sweep through and co-ordinate all the technical research work; when that day comes, we shall be ready, properly organized and functioning so well that it would be foolish not to ask us to take our place as the leader in the great field of heating and ventilation."

Mr. Timmis declared that we as a nation have recently discovered the value of co-operative effort. The great war has demonstrated the value of the engineering societies, also the engineer, who, in a large measure, has contributed to the success of our arms. He then spoke of the efforts being made by the American Engineering Societies Committee, representing the five largest engineering bodies, to formulate "American Standard Industrial Safety Codes," and he referred to the fact that the heating engineers' society is one of the technical associations that are co-operating in this movement. Continuing, he said:

"This effort serves to remind us of other efforts of a national character which undoubtedlv will be launched. The National Bureau of Research will ultimately become the clearing house of all the work of individual societies.

"The Bureau of Standards will probably and wisely extend the scope of its influence and the value of its service, by genuine co-operation with technical societies and by adopting and publishing standards as properly established by responsible societies of engineers. Our society has been invited by the A. S. M. E. Boiler Code Committee to appoint a Conferring Committee to work with their committee on such matters as we are interested in. Doubtless, the adopted standards of the A. S. M. E. and other societies will sooner or later be adopted by the U. S. Bureau of Standards and issued by the bureau as such. This brings us to the consideration of standardization of computations and performance of apparatus and heat transmission standard performance tests of such apparatus as is capable of proper classification.

"The need for dependable statistics on engineering matters was never greater than it is to-day. There is valuable information buried in the archives of this society's proceedings which should be resurrected, classified, amplified and issued by the society for the use, not only of its members, but as a guide for manufacturers, contractors, and other engineers who are not members of our society, and to the public."

President Timmis paid a tribute to the late William F. McDonald who at the time of his death was chairman of the Membership Committee. "Mr. McDonald," he said, "was a man of rare qualities who gave unstintingly of his time and efforts for the good of this society. It was he who made it possible, by his work on this committee, to increase the scope of our activities, and I ask you to rise and stand for a moment in silent admiration and respect for the man who so faithfully served this committee."

Mr. Timmis referred to the critical after-the-war conditions in Europe and mentioned the opportunities in China where the government is contemplating the development of over 100,000 miles of railroads in the immediate future.

On the subject of "Prices," he said:

"I have been asked by clients who contemplate prosecuting new work about the prospects of prices coming down. For a time, this question was very perplexing, as the post-war prices in some cases are higher than the war-time prices, while in others they are less; still, the general level of prices prevalent in the building trades is not

greatly lowered than were the prices at the end of active warfare. In endeavoring to give an adequate answer to this question, perhaps it will be well to analyze the causes of inflation and to see whether we can arrive at a reasonable answer to the question."

He attributed the inflation to the $180,000,000,000 of paper securities which have been put out by the various governments during the last four years. In addition he showed how there has been an inflation of $36,000,000,000 worth of paper currency and $50,000,000,000 of bank deposits. In concluding, he said:

"In all parts of the world the shelves are empty and must be filled, and while most of the manufacturing sections of England will be slow in resuming production, owing to their limited facilities for purchasing and otherwise securing raw materials, to-day we are in a position, both as to material and food and labor, to fill these shelves which will supply ample work, but there does not seem to be any hope or expectation that the prices of labor or material will be materially reduced for a long time to come.

"I believe that we can conscientiously advise resumption of building activities and general business on the basis of present prices, when we review present and pre-war conditions, where it is shown that money has so greatly increased in volume while the material things have practically diminished in volume, but have relatively increased in price."

Following the president's address, chapter reports were presented. Dr. E. V. Hill speaking for the Illinois Chapter, reported a roster of 103 members. These were followed by the report of the Committee to Co-operate with the U. S. Navy Department.

REPORT OF COMMITTEE TO CO-OPERATE WITH NAVY DEPARTMENT.

In this report an account was given of the important work done by a committee of the society composed of B. C. Batcheller, W. H. Carrier, William H. Driscoll, E. V. Hill, J. I. Lyle, F. R. Still and W. S. Timmis, in connection with the heating, ventilation and humidification of battleships and submarines and in conditioning the air in submarines.

One of the interesting things mentioned in the report was that in the naval engagement off Jutland the Germans are reported to have fired "poison gas" shells, some of which exploded inside the superstructure of some of the ships in which were located the ventilating fans. The ducts for conveying the air from the fans to other and remote compartments, passed through the bulkheads, thus conveying the poisonous gases to parts of the ship not otherwise directly affected by the explosion. As a result of this, it was reported that orders were issued by the British Admiralty to disconnect all ducts when they passed through bulkheads, stop up the holes and put blank flanges on the ends of the ducts, thus putting the ventilating systems out of commission during the war.

The committee recommended that the ventilating systems on United States ships be split up into smaller units, one for each compartment between bulkheads, on each deck. The report stated that a fan built so that the air current in the ducts can be immediately reversed by throwing a lever through an arc of 90 deg. should largely overcome the objection of the blowing of gases from one compartment to another.

Special interest centered in the committee's comments on the heating of submarines, both were submerged and when on the surface; moisture removal; hydrogen elimination; and ventilation, submerged and when on the surface. Three general methods of solving the heating problem were considered: stored heat, generated heat (during submergence), and elimination of the necessity for heat by insulation.

The committee investigated the characteristics of combustion of carbon and oxygen, combustion of smokeless powder, also of hydrogen and oxygen and of acetylene and oxygen, and heating from other hydro-carbons. It also went into storage of heat in water and heat from storage batteries. The seven sug-

gested methods of heating were accompanied by several pages of useful data.

On the subject of submarine ventilation, the report pointed out that in winter natural ventilation is impossible, whether standing or moving, in any kind of weather. Artificial ventilation is positively necessary when submerged. This is equally true in the summer time, except when the submarine is standing or moving on the surface.

For summer cooling, the report stated that with a properly-designed ventilating plant, the vessel should be kept fairly comfortable at all times by a copious circulation of air well directed through adjustable nozzle outlets so placed as to enable the crew to direct the flow of air either onto themselves, or to some other direction, whichever affords them the greatest comfort. The volume, it is added, should be well above the usual standards.

As to recommendations for purifying or revivifying the air, the committee did not feel it within its province to make any recommendations as to the way to proceed to make the air usable over and over again, for long periods, while the vessel is submerged, as it considered that matter to be a study in itself, and a vast amount of thought has already been devoted to it by those closely associated with the development of submarines, as well as the most competent chemists. The report, however, stated that any devices which are developed for purifying or reviving the life-sustaining qualities of the air must be designed so as to become an integral part of the ventilating systems and be easily switched off and on.

The committee's recommendations are based on the idea that it is intended to build larger submarines than the present types, as space would hardly permit the suggestions being executed in the smaller vessels.

A further report of the Committee on Schoolhouse Standards, Frank Irving Cooper, chairman, was presented by Secretary C. W. Obert.

A paper was then presented on "Classroom Ventilation," by Konrad Meier.

Class-room Ventilation.

In this paper Mr. Meier discussed at length the report on class-room ventilation and respiratory diseases among school children, made by Dr. S. Josephine Baker, for the New York Department of Health, which made such a stir last year when it was published. Mr. Meier cited a number of points on which the tests were not conclusive. He admitted, however, that present practice in mechanical ventilating is not yet meeting all the reasonable expectations and offered a number of suggestions for avoiding the faults of past and present practice.

"It is a fact," he said, "that currents of excessively hot and dusty air from the older types of direct-heating apparatus will be dissipated and relieved by open windows, while mechanical ventilation is less efficient in this respect. A fair inference would be, that the heating is at fault, rather than the ventilation, which must bear the criticism, as a rule. Even the best of steam-heating apparatus as now installed is hardly fit for class-rooms, because of the locally intense and intermittent radiation. It is difficult to distribute and place the heating surfaces in such manner as to avoid disagreeable and excessive radiating effects for the nearest pupils.

Any shields and screens used to prevent this turn the direct heat into indirect hot-air heating. This raises the air temperature for equal comfort, because of the missing radiant heat, which does not require the medium of air to be effective. The higher air temperatures mean excessive dryness and increasing dust nuisance. If, in addition, the fresh air supply is tempered by indirect steam-heating surfaces without previous cleaning this dry and dusty condition is not likely to be relieved by it. It may even be aggravated where the air is introduced above room temperature in order to assist heating or to avoid draughts. In such cases the satisfying effect of opening the windows lies not only in the stimulation due to the momentary cooling, but in the lower *air* temperatures maintained while fresh and cooler air is admitted. On mild winter days when there is a tendency to overheating, this will naturally be found

more pleasant and beneficial so long as the walls are not chilled and excessive draughts are prevented. But for average winter weather and especially in city schools, fair conditions are most difficult to maintain by such means, that is, by open windows. It is here that mechanical ventilation must step in. It will only be successful, however, if conditions are secured with it similar to those secured with open windows in pleasant weather. The air must be sweet and cool with gentle, barely perceptible motion.

WATER HEATING SUGGESTED FOR CLASSROOMS.

The requirements of classrooms therefore might be better met by direct water heating, which must, and *can* be, just as responsive as steam, while providing radiant heat in milder form, gradually decreasing during the sessions and as the rooms are tending to warm up. The heating surfaces should be underneath the windows and outside walls and distributed for their entire length. This will avoid the need of screening against intense radiation, which is undesirable with any system. Heating surfaces should be easily cleanable and the dust should be seen so that it will be removed. Piping forming dirt corners should not be tolerated within the classrooms.

HEATING SHOULD BE INDEPENDENT OF AIR SUPPLY.

It is preferable on the whole to have the heating sufficient in itself and independent of the air supply. The ventilating plant may then be designed and operated to better advantage, that is, more strictly for its own particular duties, which lie more in the direction of cooling. It must carry off an excess of heat generated by a room full of pupils, sometimes increased by the sun or other heat sources. This cooling is difficult to accomplish by an air supply that is first called upon to heat, because the changes from hot to cold in themselves increase the liability to draughts, owing to the higher air temperatures at the beginning of the sessions. Even with gradual regulation through double ducts and mixing dampers the results are doubtful and the uncertainties are increased by the difficulty of permanently adjusting the distribution between several rooms under varying delivery. Heating with well-distributed and moderately hot surfaces, which creates the fewest hot-air currents and tend in itself to lower the air temperature, also allows a constant supply to be introduced at lower and more even temperature, that is, with the least danger of draughts. But even then, air below room temperature cannot be introduced safely through one large register with open meshes, as now most frequently used. It is advisable to provide two or three flues for classes of normal size with openings divided into several vertical slots, separated so as to split up the stream of incoming air and to mix it before it reaches the breathing zone. Since smaller flues are easily placed in the division walls, such layouts are not impractical and not unreasonably expensive.

EFFECT OF FAILURE TO PROVIDE MEANS FOR REMOVING FOUL AIR.

A further cause of poor results is often found in the failure to provide proper means for the removal of the foul air. Any plenum system, depending on the pressure of the supply fan to crowd out the air somehow, is bound to be unreliable, because the renewal will then be largely affected by wind pressure, temperature and a number of conditions beyond control. Moreover, the distribution is always difficult to adjust where delivery is governed by accidental leakage. In rooms with leakage overhead where the outward pressure is greatest, a large part of the fresh air will never reach the breathing zone, which means reduced efficiency of ventilation. But a good exhaust system is not only desirable for the handling of the proper volumes, it is also more effective in removing the school dust and stuffy air resulting from it, just as smoke is cleared away better under suction. From this point of view a slight excess of exhaust capacity would seem to be desirable and should do no harm in other respects.

PERFECT CONTROL NEEDED WITH MECHANICAL VENTILATION.

Mechanical ventilation can only meet the requirements, if the volume, temperature and purity of the air supply are under perfect control. If owners are not willing to pay for the equipment necessary to that end, it is better to desist. In most cases, however, it is possible to economize by boiling things down to the simplest form without sacrifice of capacity or essential parts. In fact, the plant is often improved in the process of working it over.

IMPORTANCE OF CORRECT DESIGN OF AIR DUCTS.

Another factor bearing on the results, to an extent not generally appreciated, is the correct design of the air conduits. To plan and build these on sanitary and true aero-dynamic principles is not only practicable, but advantageous in more than one respect. It gives assurance of distribution and delivery with the least power and the fewest chances of noise; in short, it makes for an efficient and smoothly working system. To obtain the best results is not a matter of following any particular set of rules in calculation, but of intelligent treatment of the individual problem. As guiding principles may be mentioned, that the ducts should always be as short and straight as possible and that the air supply ducts in particular should be made self-cleaning, which means a design with fairly high velocities and avoiding sudden enlargements and contractions, sharp turns and all unnecessary losses of motion in general. Even if self-cleaning, at least the horizontal mains should be accessible for inspection and adjustment, if need be. The necessity for the latter, however, should be avoided by proper calculation on the basis of even total pressure losses for all points of delivery. The design must go hand in hand with such calculation. While the shapes must be suited to the material and be easy to build, it is always possible to find a solution assuring an easy flow and avoiding such features as are uncertain in effect.

Even complicated systems, when accurately sized and installed under intelligent supervison, should distribute the right volumes at the first trial without any deflectors or other adjustments. Dampers should not be required, except at the main intake and outlet on roof. Such plants are preferable, because they will handle the air with the least resistance and power, require moderate speed and mainly also, because they are less likely to be tampered with. Every opportunity for throttling and shutting off increases the chances of disturbing deliveries, hence also of complaints of interference by incompetent parties, which is a frequent source of dissatisfaction. Since the process of adjustment after installation is uncertain at best and we are never sure of its being carried out right, owing to wind, weather and the personal factor, it is best to *forestall* by accurate planning. This means painstaking work and experience in laying out and supervising, but then, mechanical ventilation is a complex and difficult matter presenting certain problems that cannot successfully be accomplished by thumb-rule methods.

CONDITIONS TO BE MET IN THE DESIGN OF MECHANICAL VENTILATION FOR SCHOOLS.

If mechanical ventilation is to have a future in schools and other public work, it seems necessary:

1. To limit installations to cases within the legitimate field, that is, where natural methods, owing to particular and unquestioned conditions cannot satisfy.

2. To design new plants strictly on sanitary lines, paying more attention also to the heating apparatus. Heating should be independent of ventilation. Classes should be warmed mainly by radiant heat in mildest form and well distributed. The air supply must be pure and cool, its temperature but slightly lowering during sessions, which means careful distribution and diffusion. Positive means for exhaust are necessary to assure the proper change of air and desirable for the effective removal of dust. Careful design of ductwork is essential to avoid irregular delivery of air in classes through tampering or throttling in other rooms.

3. To go over the earlier plants, that have given rise to complaints, and improve or rebuild them in the light of present experience. This task is most difficult and can be entrusted only to thoroughly competent and trustworthy parties, but it seems important to remove at least the worse and, so far as possible, all of the just causes of complaint.

4. To obtain numerous records of air conditions for entire seasons secured by various systems of ventilation and heating in actual use, accompanied by accurate plans and descriptions of the plants.

5. To start research as to the methods of heating and ventilating, that will produce in the long run and with the least difficulties the most desirable air conditions, measured by accepted standards as well as by daily impressions.

A paper on "Heating and Ventilation of a Detroit School Building," was then presented by Professor J. H. McColl. Mr. McColl described at length numerous tests conducted in a school building in Detroit in which comparisons were made between window-ventilated and mechanically-ventilated classrooms. A number of charts accompanied the paper, the conclusions bringing out very forcibly the inadequacy of windows as a means for securing proper indoor air conditions.

On motion of H. M. Hart, it was voted to appoint a committee to report on the grading of engineers in school buildings with a view of obtaining better operation of school ventilating plants.

J. A. Donnelly argued that ventilation should be considered from a commercial standpoint as costing so much and that the heating alone would cost less, due to the saving in fuel. Those in charge of buildings equipped with mechanical ventilating equipment should understand that ventilation costs money and the question for them to decide is whether they are prepared to pay the price.

Professor Allen cited the law in Minnesota which requires the installation of adequate heating and ventilating plants. "Nothing is said, however," he added, "about their operation and the result is that in many cases they are not operated."

Afternoon Session, June 10, at Bureau of Mines.

After luncheon the convention party proceeded to the building of the United States Bureau of Mines, located near the group of buildings comprising the Carnegie Institute of Technology. This was a 20-minute trip by trolley from the hotel. Here the afternoon session was opened in the assembly room, close to the east wing of the building where the Bureau of Research of the heating engineers' society will conduct most of its experimental work. After referring to the significance of the occasion, President Timmis called upon J. I. Lyle, chairman of the Research Committee, for a report of the latest developments in connection with the undertaking.

Report of Research Committee.

Mr. Lyle stated that since the last annual meeting the appointment had been made of a research executive committee, consisting of Perry West, Homer Addams, S. R. Lewis, G. W. Martin, and the Chairman, J. I. Lyle. At the same time Perry West was elected vice-chairman of the Research Committee. The executive committee was authorized to enter into a contract with the U. S. Bureau of Mines which, Mr. Lyle stated, had been signed. A copy of the contract was attached to his report.

The committee continued the report, authorized the chairman to appoint a sub-committee of five to be known as the Subjects Committee, to determine upon the subjects on which research should first be undertaken. This committee is made up of Professor John R. McColl, chairman; Professor S. E. Dibble, H. M. Hart, Dr. E. V. Hill and Perry West.

The executive committee, it was stated, has also made a contract with Dean John R. Allen of the University of Minnesota, to act as director of the Bureau of Research.

The report also told of the joint meeting of the Research Committee with

representatives of the Working Conditions Service of the U. S. Department of Labor in New York, May 19. At this meeting there was also present Professor C. E. A. Winslow, who has been directing research in ventilation for the Division of Industrial Hygiene and Medicine of the Working Conditions Service.

"A most pleasant and profitable conference was held," continued the report, "in which it was agreed that each of the parties would feel perfectly free to call upon the other for any assistance that might be expected in research matters. It was pointed out that no doubt the society could give the Working Conditions Service a great deal of assistance in technical matters, and that the Working Conditions Service could undoubtedly be of a lot of use to the society in supplying data on actual field observations of heating, ventilating and air-conditioning plants.

The budget determined for the Research Bureau for the coming year, beginning August 1, 1919, is as follows:

Salary of director and assistants		$11,000
Office supplies		500
Traveling expense		1,000
For supplies needed for investigation of heat	$1,500	
For ventilation	4,500	
For subsidizing work in other institutions	1,500	7,500
Total		$20,000

Special attention was called in the report to the resolution passed by the Research Committee to the effect that:

"In order that the activities of the Research Bureau shall be above reproach, it is the sense of the committee that no tests, experiments or research shall be conducted for compensation."

Director Allen, it was stated, will enter upon his duties August 1 and the committee feels sure he will be able to report very material progress by the time of the annual meeting in January, 1920.

Up to date the committee has secured subscriptions totalling aproximately $18,000. The Bureau of Mines will contribute in rent, salaries, service, etc., the first year, approximately $25,000, and in succeeding years probably as much as $30,000. The committee's budget calls for $20,000 for the first year and it is desired to raise at least $25,000 on the first year's quota. The committee believes it will be easy to add to these subscriptions in succeeding years after the bureau has begun to show results.

Later in the session, when Chairman Lyle called for individual subscriptions of $40.00 each, responses were made on the spot which will bring up the committee's total to nearly $20,000.

Following Mr. Lyle, the report of the Subjects Committee was presented by J. R. McColl, chairman. Professor McColl read letters containing a wide range of suggestions, many of which were published in THE HEATING AND VENTILATING MAGAZINE for June, 1919.

President Timmis stated that the bureau should try to determine what are the ideal physical conditions of the air, ideal means of securing such conditions, how far present apparatus meets these ideals, and the cost of operating such apparatus. He said there was much dependable information now published, but scattered, which the Research Bureau should collect and classify.

Perry West said that in his judgment the bureau should first take up the matter of standardization, followed by the collection of data, after which it should undertake original research. The public, he said, has no unit to guide it in weighing the value of heating and ventilation. The discussion also brought out the opinion that the design and perfection of apparatus ought to be left to the manufacturer. "We know very much less about what ought to be done," said one speaker, "than do the manufacturers about how to do it."

Director Allen was then called upon to say a few words about the bureau's work. As he arose to speak, he was given an ovation, the assemblage rising to its feet and applauding him heartily. Professor Allen expressed his appreciation of the reception accorded him and expressed the opinion that the bureau should proceed upon the plan outlined by Mr. West and in the order of in-

vestigating and collecting data, establishing standards and finally, conducted research work. There is no necessity, he said, of doing anything over again that has already been done well. He also pointed out that research takes time and instanced an investigation he had started at the University of Minnesota which he expected to complete within a few months. Instead of that it took several years to secure the desired data.

In answer to an inquiry, Professor McColl stated that the investigation would include the testing of house-heating boilers.

Dr. E. V. Hill emphasized the importance of the establishment of standards by the Research Bureau.

J. A. Donnelly urged that research work be done in the field as well as at the bureau itself. He also said he wondered what would be done with the results obtained and urged that the chapters start a campaign of education to familiarize the public with the activities of the bureau. He showed a simple punch used in his own experimental work for drilling holes in wrought-iron pipe and told of a wrinkle he had used of tapering down the nipples of thermometers to 1/2-in., so that they could be inserted in holes drilled in the sides of pipe without making too large a hole.

Others who discussed the bureau and its work were P. J. Daugherty, who discussed the testing of cast-iron boilers; H. M. Hart and John F. Hale, who urged that the chapters be given work in connection with the Research Bureau; Professor S. E. Dibble, who recommended the standardization of the process of erection of apparatus; H. Kreisinger, of the Bureau of Mines; and G. E. Bennett, of the American Gas Association, which has arranged to co-operate with the bureau.

A paper was then presented on "Continuation of Work in Dust Determinations," by Dr. E. Vernon Hill and Otto W. Armspach. The paper was read from manuscript by Mr. Armspach and was supplemented by comments by Dr. Hill. A number of lantern slides accompanied the paper which will appear in the printed copy.

After the adjournment of the session, the convention party was divided into squads for an inspection of the Bureau of Mines building. The recent use by the War Department of some of the quarters which will be occupied by the Research Bureau made it impracticable to get an accurate idea of how things will look when the Research Bureau is ready to begin its work, but a general idea was had, nevertheless, of the facilities of the building, the inspection including a visit to the power house and to the quarters where the boiler and air heater tests were conducted, as described in Bureau of Mines bulletins.

The members returned to the main building where a buffet supper was served. Later the convention party attended the play, "Twelfth Night," given by the students of the School of Dramatic Arts of the Carnegie Institute of Technology for the special entertainment of both the heating engineers and members of the National District Heating Association.

Morning Session, June 11.

Thursday morning's session was opened with the presentation of A. W. Moulder's paper on "Utilization of Sprinkler System Piping for Heating."

Utilization of Sprinkler System Piping for Heating.

The author stated that results obtained from a number of systems of this type, coupled with the fact that the Underwriters' Laboratories have approved its use, leads him to believe that this system is destined to come into quite general use for certain classes of buildings.

The system may be designed on either the gravity or forced water principle, utilizing either steam heaters, or circulating directly through boilers, according to local conditions. The sprinkler system proper, from the sources of water supply to the last head of each lateral line should be designed in conformity with the rules governing separate sprinkler equipments. The only exception to this is that the tees in these lines are turned on the side and a so-called insulator is installed between the line and the sprinkler head.

The efficiency of the insulator, said the author, is clearly shown by tests

conducted by the Underwriters' Laboratories (which accompanied the paper). Other tests showed that the insulators were not affected by temperatures as low as —5° F. maintained for a 3-day period.

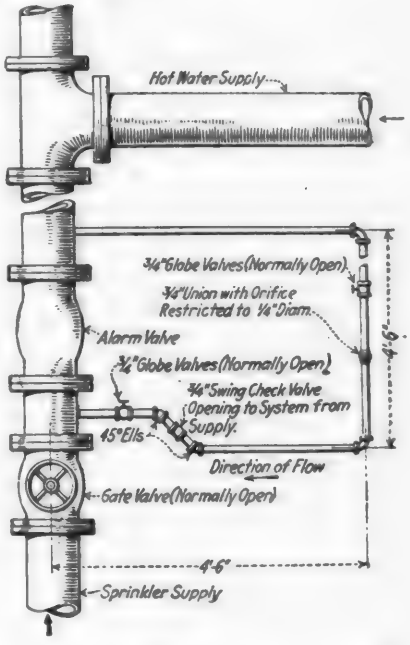
The expansion and contraction of the water in the system is taken care of, under the Underwriters' rules, by means of a 3/4-in. line at the source of the water supply, installed as a by-pass around the alarm or check valve, and by water relief valves. The 3/4-in. bypass is illustrated herewith, and it will be noted that a union with bushing having a 1/4-in. orifice is installed in this. Two spring-loaded-type water-relief valves are installed at the heater or boiler, one set at 10 lbs. above the highest pressure at source of water supply, and the other at 15 lbs. above the same pressure.

The supply main from the heater should be connected inside of the alarm or check valve and should be equipped with a valve so that the heater may be shut off from the sprinkler system should occasion demand. Where auxiliary radiating surface is required, the connections for this should be taken separately from a point on the heater side of the main shut-off valve.

A complete system of return lines must, of course, be run, connecting to all lines. Inasmuch as all of the sprinklers piping up to the last head must be of regular sizes used for sprinkler systems, it is in the design of the return piping where the equalization in flow of hot water must be taken care of. Very good results have been obtained by the use of an additional valve used as a throttle in the return from each series of lines, but the author very much favors the plan of equalizing these by means of variations in the size of these connections. This can, of course, be done much more easily if the returns are planned on the basis of "first supply—last return" in which case, the connection to each series of lines can be figured as should ordinarily be done for one-pipe coil.

The elimination of air from the system can be accomplished by means of the installation of automatic air traps on the return lines.

In calculating the heating value of the radiating surface contained in the sprinkler piping, we may allow possibly a slightly increased value over that ordinarily figured for overhead pipe coils, on account of the better air circulation around the pipe. Where these calculations show that only a small amount of auxiliary radiating surface is required, it has been found economical to increase the size of all lateral lines to 2 in. from the first to the last head, in order to obtain the added heating surface. It is required by the Underwriters that the maximum outgoing water temperature be 212° F.



BY-PASS FOR TAKING CARE OF EXPANSION AND CONTRACTION IN SPRINKLER HEATING SYSTEM.

It will, no doubt, be obvious that this system is economically more adaptable to buildings of such design that the ceiling surface is large in proportion to the total heat loss, which means that the radiating surface contained in the sprinkler piping will be large in proportion to the total radiating surface required.

Among the lesser advantages experienced in operation of the combination system it is found that the sprinkler system is free from air, thereby causing an earlier alarm and immediate delivery of water and that, should there

possibly be a stoppage in any part of the sprinkler system, it would be apparent in the immediate stopping of circulation, thereby affording a means of inspection on the sprinkler system.

The application of this system will, of course, be limited first of all to the buildings where the engineer would consider it good practice to install an automatic sprinkler equipment and where conditions will permit the use of a hot water heating system. It will be obvious that the chief underlying reason for the combination is saving in first cost of installation. The saving in first cost will depend on how nearly the heating surface of the piping in the sprinkler system will come to the total amount of heating surface required to offset the heat loss. Therefore the type of building where the system is most adaptable will be where the ceiling area is greatest in proportion to the total heat loss. The multiple-story building of a considerable width or warehouse type of building will usually more closely approximate this condition than any other.

The efficiency of the combined system as a means of fire protection seems to be in every way as good as a separate sprinkler system, and there is no doubt some merit to the claims that the combined system will have more intelligent care and attention than the separate sprinkler system in that heat is essential in the building and heat can only be obtained when the system is in good working order, and also that the combined system assures the freedom from obstruction of sprinkler piping because circulation could not otherwise occur.

The efficiency of the combined system, as a heating system, should be practically the same as a separate water heating system for the same building.

There may be a question as to the possible injury to persons due to the opening of heads while the lines are filled with hot water, and this seems to be answered by the theory that as the water is discharged it is sprayed by the deflector on the head, and thereby cools sufficiently to reduce any possibility of scalding.

The convention then had the pleasure of listening to a paper contributed by its one woman member, Miss Helen R. Inniss, on "Remodeling a Heating System." Miss Inniss acquitted herself with distinction and was warmly applauded as she finished her presentation.

An idea of the huge size of some of the war plants was given in the next paper on "Heating and Ventilating Systems at the United States Smokeless Power Plant at Nitro, W. Va., contributed by G. W. Hubbard.

George S. Barrows, of the American Gas Association, contributed to the discussion by telling of recent experiments made by his committee, on gas heaters, the subject of his paper being "The Use of Gas Fuel in the Heating of Buildings."

He said the products of combustion from gas heaters are not as dangerous as generally considered as the combustion is practically complete and the carbon dioxide given off does not of itself seriously impair the air for breathing purposes. He said that gas heating, with the latest improved devices, was about 20% higher in cost than steam or water heating.

President Timmis presented a communication from the Bureau of Standards regarding its proposed industrial safety code. The bureau desired to know whether the society wished the Bureau of Standards to initiate work on such a code and whether such a code should be prepared by the sponser bodies. It was voted to appoint a committee to consider the matter and reply to the bureau.

Afternoon Session, June 11.

After luncheon the delegates gathered on the lower floor of the hotel for the joint meeting with the National District Heating Association. Besides affording the opportunity for meeting the members of the district heating association, this plan enabled the delegates to inspect the exhibits in the room adjoining the convention hall, many of which

were found of as much interest to heating engineers as to the district heating men.

The report of this session will be found in the account of the convention of the National District Heating Association, on another page of this issue.

Morning Session, June 12.

For the final session, the first paper was contributed by C. R. Honiball, one of the society's English members, on "Cracking of Cast-Iron Sectional Water Boilers."

A paper transferred from a previous session was then presented, on "Heating and Ventilating the Standard School House," by J. D. Cassell.

Heating and Ventilating the Standard School House.

Mr. Cassell's paper was a general review of past and present methods including the air furnace, which he defended as suffering from the errors of those making the installations.

Regarding the "unit" system, where air is passed over a direct radiator, enclosed and located under a classroom window, the air being moved by a squirrel-cage fan, Mr. Cassell said: "If automatic temperature and humidity control are provided, this system has one great advantage in operating cost, as any room in the buildings may be ventilated at a minimum expenditure, without operating an apparatus designed to ventilate the entire building. There is, however, a disadvantage not to be overlooked in that the air supplied cannot be thoroughly washed, or even properly screened due to lack of space."

His general conclusion was that we are not ready for any one method as a standard, but should recognize all the good features in all the good methods, and design what is best adapted to the particular building.

He suggested the public schools as the ideal place in which to recognize a new and lower standard temperature of 65° F. for the classroom, instead of 68° and 70°. This he said can be accomplished by maintaining the proper percentage of relative humidity. He advocated that the standard relative humidity should be fixed at from 45% to 50%, closing his paper with an endorsement of the Hill synthetic air chart for determining the percentage of perfect ventilation.

The final paper was on "Combustion," by Morgan B. Smith.

Combustion.

In this paper Mr. Smith first discussed the formation of coal. He then considered, in order, the nature of coal, the meaning of combustion, theoretical amount of air required, practical amount of air required, how to determine the proper amount of air, furnace temperatures, what causes smoke, and coal ash. In answer to the query as to what causes smoke, the author stated:

Smoke results when combustion is imperfect. It is usually caused by one or all of the following conditions:

1. Lack of sufficient air to the fire.
2. Lack of proper mixture of air with the furnace gases.
3. Low furnace temperature.
4. Too small combustion space, so that the gases reach the comparatively cool boiler surfaces before they are completely burned, resulting in condensation of soot and tarry matter which then passes up the stack in the form of smoke.

Sometimes smoke results from very high furnace temperatures. Under such conditions we have very nearly the theoretical amount of air going to the fire, making difficult the proper mixing of air with the combustible matter of the fuel. In such cases combustible matter passes up the stack in the form of smoke.

The meeting closed with reports of the Weather Bureau Committee, W. G. R. Braemer, chairman, and of the furnace committee, J. D. Hoffman, chairman, adjournment being taken in time to enable the members to catch the boat for the visit to the McKeesport Works of the National Tube Company.

NATIONAL DISTRICT HEATING ASSOCIATION

PLANS MADE AT ANNUAL MEETING FOR ADVANCE OF THE INDUSTRY UNDER NEW CONDITIONS

No one who has had anything to do with central station heating during the war-period has failed to realize that this industry has suffered severely from war conditions. Between the soaring prices of the industry's staple, coal, and the prices set by State public utility commissions for its product, steam and water heat, the district heating companies can tell just how it feels to be between the upper and nether millstones.

With characteristic American grit the companies have, for the most part, managed to weather the storm and the National District Heating Association's annual convention, in Pittsburgh, June 10-13, 1919, found everyone's face turned toward the future, with optimism the predominating note. It was felt that the worst is known, especially regarding the coal situation, while the rate situation is coming around to a point where the companies can see daylight ahead. Rates, it was felt, are not yet what they should be to provide an adequate return to the companies, in spite of the general raises permitted by the commissions, but it was the consensus of opinion that further raises will be found to be reasonable and will receive the endorsement of most of the commissions.

J. C. HOBBS, PITTSBURGH, PA.

Elected President of National District Heating Association.

As far as attendance was concerned, the convention measured well up to those of preceding years and the lapse resulted in many renewals of acquaintances that enhanced the social features of the meeting. The fact that The American Society of Heating and Ventilating Engineers was meeting at the same time, in the same hotel, offered the opportunity for the two societies to get better acquainted with each other, especially as a joint meeting was held on the second day which was presided over in turn by the president of each association.

Morning Session, June 10.

The delegates were welcomed to Pittsburg, at the opening session, Tuesday morning, by C. C. Cook, general manager of the Duquesne Light Co., of Pittsburgh. Secretary D. L. Gaskill responding on behalf of the association.

President George W. Martin then presented his address which was given the title of "Ten Years of Progress."

President's Address.

President Martin called attention to the fact that the convention was celebrating its tenth anniversary and recounted the meeting at the Hotel Boody, Toledo, July 15, 1909, when the formation of the association was discussed, those present including A. C. Rogers, Toledo; A. N. Cope, Springfield; W. A. Wolls, Columbus; E. F. Gwynn, Delaware; D. J. Hard, Cleveland; and Grant Miller, Toledo. On November 10 of the same year the first convention was held at the Great Southern Hotel, in Columbus, O.

"From that time," declared President Martin, "to the present the growth of the association has kept pace with the development in the industry, or what is nearer the truth, the work of the association has given a stimulus to the development of district heating which in turn has reacted upon the association to strengthen and increase its growth."

President Martin pointed out that at the time of the 1909 convention, the membership of all classes totalled 38, while today the membership numbers 153 in Class A, 101 in Class B, 13 in Class C, 56 associate and 2 honorary, a total of 325. He also characterized the election of D. L. Gaskill as secretary in 1909 as "a fact to which we may attribute in no small degree the present robust condition of this association."

Referring to the present status of the industry, President Martin said:

"Most all of the developments in the district heating business have been made in the past ten years and, in the opinion of many, the N. D. H. A. has been responsible for the greater portion of this development.

"Steam generation has, of course, advanced with general power plant practice. The distribution of steam for district heating has, however, undergone a marked change, owing to the gradual elimination of the reciprocating unit operating under a back pressure for the supply of exhaust steam. The introduction of the bleeder turbine and the change in design of high-pressure steam-using apparatus to operate on low pressure have prolonged the practice of low-pressure distribution, but the tendency as seen by the speaker is now toward distribution of live steam at higher pressures and eventually the end of district heating by means of exhaust steam.

"The betterment of the service by the company to the customer has been noteworthy, brought about not only by improvements in methods of installing underground construction and customer's service connections, but also by advances in the type of building piping which have made it possible for the company to give much better service at a lower cost. The co-operation of the company in the matter of advice to the customer as to design and operation of heating systems has also improved the relations between company and customer to a marked degree, and resulted not only in reduction of customers' bills, but also earned for the company a higher rate per 1000 lbs. where block rates or sliding scales are in force, since the steam saved may be sold to new customers in the higher blocks of the rate.

FORMER ATTITUDE TOWARDS HEATING DEPARTMENTS OF UTILITY COMPANIES.

"To show the condition of the district heating industry ten years ago, I can do no better than quote from a letter from Past President Spencer:

" 'The one development that overshadows all the others is the revolution in the economic standing of the heating business. Ten years ago, the heating business had a very poor reputation. Most of the electric companies believed it to be a losing proposition although the cost of furnishing the service was imperfectly known; and it was maintained as a necessary evil, as a service which once entered into, could not be abandoned. Heating departments were usually neglected by the management, and left to the casual attention of subordinates. The heating business, which had developed from the sale of a small amount of exhaust steam to neighbors, had been allowed to grow in its own fashion. Rates had been based on the idea that money received from the sale

of exhaust steam was all profit; and the companies were beginning to realize that such was not the case. The rapid growth of the heating business, and the inadequate supply of exhaust steam had made heating an expensive nuisance.

" 'Up to the time when the association was organized, very little seems to have been done to determine the cause of the trouble, and to see what could be done to improve conditions. The association has been a powerful factor in showing the true conditions; also in bringing about the radical change that has taken place. The heating business has been set up, as far as possible, on its own feet, and many companies have been able to greatly improve their financial results. Due very largely to the efforts of the association, managers have taken new interest in their heating business.'

"The speaker's connection with the district heating industry dates from early in 1911, and one of the early impressions received was as indicated in Mr. Spencer's letter, that district heating was maintained as a necessary evil which once established could not be abandoned. Many of the rates resulting from this attitude would probably have been but slightly higher to-day if the great war of 1914-1918 had not greatly increased costs of steam generation and supply. Managers accustomed to accept rates as unchangeable were forced to fight for higher rates and it is to be hoped that the proper fighting spirit developed in our member companies will enable them in future to demand and receive a fair return on the investment. The practical elimination of the flat rate has helped to put the industry on a sounder financial basis while better systems of accounting have made an equitable distribution of costs possible and enabled managers to establish a just rate for the service rendered. It is to be hoped that in the future the work of our Accounting Committee and of our Advancement Committee will be of material benefit in fixing the questions of costs and rates.

"The future of district heating, in the speaker's opinion, appears to be not so much with the separate heating companies, but rather in connection with the public supply of electric current. If we then consider the supply of steam for heating as an adjunct to the supply of electric current, there are doubtless cases where the former service may be rendered by a corporation which is not a public utility, but which operates as a contractor for the supply of fuel, labor and other items for the operation of individual steam plants or groups of plants connected into the so-called block systems. There is no doubt in the speaker's mind that such a contracting company can do business on an entirely proper basis as between itself and the electric company. The plan has one advantage in that the contracting company is not subject to commission control. On the other hand, however, it may be desirable in some cases to connect buildings on opposite sides of a street, and in some cities this can be done only by a public utility, unless the properties are under the same ownership or leasehold.

"The past four years of war and especially the later years of our country's participation have strained our financial resources and placed upon us a great mental and physical strain, but we can look back on the past ten years' work in our industry with the satisfactory thought that in spite of obstacles we have reached a recognized place in the affairs of men. Let us look forward to the next ten years with a resolve to keep pace with the other great industries in this great country of ours."

SECRETARY-TREASURER'S REPORT.

Secretary-Treasurer D. L. Gaskill, in his annual report, showed the receipts for the year to be $3580.56 and the expenses, $3512.56. A net loss of 38 members for the year was reported. The necessity of securing a larger income for the association's work was emphasized. The suggestion was also made that the association consider the proposition of publishing its proceedings in the association's Bulletin rather than in cloth-bound form. It was recommended that the association take up the publication of a hand-book on central station heating data and that the executive committee be given power to make the necessary contracts and to

proceed with the publication of such a hand-book.

Both of these matters were discussed at length later in a "round table" on association work. It was finally decided to proceed with the publication of a hand-book which was declared to be one of the most important undertakings the society has started. It was decided to continue the publication of the Proceedings as heretofore.

The executive committee's report reviewed the matters taken up at its meeting at Cedar Point last summer which was held in lieu of last year's convention. A number of committee reports were given out at that time and appeared later in the association's Bulletin.

A motion was carried confirming the action of the executive committee in electing Past President S. Morgan Bushnell to honorary membership.

Afternoon Session, June 10.

Committee reports occupied the time of the afternoon session, the first being that of the Station Operating Committee, J. L. Hecht, chairman. Owing to war conditions, this committee was not able to carry on any experimental work or tests, but succeeded in working up interesting information on a number of topics including the proper preparation of fuel before its delivery to the fireman, coal and ash handling methods, station organization with special reference to obtaining best efficiency in burning fuel, causes and remedies for pitting and corrosion in boilers and economizers and, finally, a discussion of operating experiences with higher pressures in power stations.

Morning Session, June 11.

The Wednesday morning session was opened with the report of the Accounting Committee, presented by A. D. Spencer, chairman. Mr. Spencer referred to the standard classification for electric utilities adopted some years ago by the National Electric Light Association. This, however, does not include any provision for heating accounts or any intimation as to how a company operating a joint electric and heating business or any other combination of utilities, should handle its accounts. This omission, he stated, had seriously limited the usefulness of the Standard Classification. The committee recommended that the National District Heating Association join with the various utility asosciations which have committees at work towards developing a general uniform accounting system. It was later voted to follow this recommendation, the association to be represented by the new Accounting Committee.

D. S. Boyden, chairman, presented the report of the Heating Research Committee, which was supplementary to the very full report of the previous Research Committee giving in detail a survey of numerous buildings of all types including full data as to their size, location and mechanical equipment. One point which Mr. Boyden said was brought out by the inquiry is that each building is a problem in itself and that it is hard to formulate any standard that will apply even to a particular class of buildings. This applies especially to hotels where the equipment and requirements vary to an astonishing extent.

As Mr. Boyden was finishing Major Charles N. Green, of the United States Construction Engineers, formerly in charge of sub-surface construction for the New York Public Service Commission, entered the hall and was given a hearty reception.

Major Greene later addressed the convention, giving an interesting account of the achievements of the Construction Division, with which he has been prominently identified. Major Green was located for some time at Camp Lee during its construction and later was in charge of the construction of the $5,000,000 ammunition plant at Woodbury, N. J. This plant, he stated, was built in 90 days. It consists of 200 buildings, mostly magazines, together with warehouses and dormitories. 3500 men were employed on its construction. Major Green told how the early confusion in starting the building programme for the various military departments was simplified by the order issued by the Secre-

tary of War that all work of this nature should be done by the Construction Division. The Ordnance Department, he said, had more construction to do than any other branch, several of the powder plants costing from $30,000,000 to $40,000,000 each, while at least one plant cost $70,000,000 to build.

Major Green corrected a common impression that the Construction Division is a part of the Engineers' Corps. This, he said, is not the case. At the time of the armistice 400 ammunition plants were being operated and shipments of adequate quantity had begun to be made.

Supplementing Major Green's address, President Martin told of the way the army cantonments came to be heated, for the most part, by stoves. The use of stoves was decided upon after a lengthy conference with the Quartermaster's Department in Washington in which several members of the Association participated, including Charles R. Bishop and Mr. Martin. The use of stoves, as is now generally known, was due to the urgency of the need, some 40,000 large heaters being used for the purpose. Four of the camps were heated by steam. The recent sale of some of the cantonments at prices that are looked upon as a tremendous sacrifice of their real value was commented upon by Major Green as being due partly to the fact that the purchasers assumed all actions pending against the property. In some cases, it appears, rent has not been paid since the land came into the possession of the government and such obligations as this will be assumed by the purchasers.

Afternoon Joint Session, June 11.

With the members of the heating engineers' society as guests, the Wednesday afternoon session was made the occasion of a joint meeting of the two associations. President Martin introduced President Walter S. Timmis, of the American Society of Heating and Ventilating Engineers, who, he said, would preside during the first half of the meeting, after which President Martin would assume the chair.

President Timmis, in taking the chair, addressed the meeting, stating that the heating engineers' society stands ready to co-operate in the fullest extent in the exchange of data and ideas. He emphasized the point that members of an engineering association must be ready to give of their experience and knowledge as well as to receive information. He hoped for many such meetings in the future and that the two associations would continue their work in close co-operation.

James A. Donnelly, who happens to be a member of both organizations, then presented a paper on "Capacities of Reducing Valves for Steam Heating Systems."

Capacities of Reducing Valves for Steam Heating Systems.

The capacities of reducing valves may be considered from two viewpoints. One, that they should not be greater than that of the inlet and outlet pipes to supply the steam and carry it away, with a reasonable or standard drop in pressure per unit of length, and that the area of the seats should be suitable for this rated capacity. The other viewpoint might be that the area of the seats should always be as large as the area of the inlet pipe and that the sizes of the supply and delivery pipes should be increased to correspond to the maximum capacity of the valve seats.

The latter method would often result in the use of a reducing valve and connecting nipples much smaller than the supply and delivery mains, and therefore much weaker structurally, from a mechanical standpoint. This would result in a design that is liable to rupture from expansion strains of the piping, and it may, therefore, be considered better engineering practice to rate the valves at the capacity of the inlet and outlet pipes and consider the necessary size of the seats for these ratings.

It is also desirable that the reducing valves and the sizes of the seats be so proportioned that the valves will have as large a lift as practicable in order that wire drawing or cutting of the discs and seats may be avoided. This also results in a more accurate regulation, as smaller seats are easier to control.

Reducing valves for steam heating systems are usually made with the pipe

size of the outlet double that of the inlet. They are usually provided with double seats of such a diameter that the combined area of the two is approximatly equal to the area of the inlet pipe, although some have but a single seat, usually the diameter of the inlet pipe. The maximum movement of the discs is usually designed for one-quarter the diameter of the seats, thus giving full area of opening of the valve, but it is doubtful if a movement as great as this is obtained without considerable sacrifice of sensitiveness, and it will, therefore, probably be preferable to calculate their capacity on a maximum movement of one-eighth the disc diameter. This will also allow a reasonable factor of safety or possibility of overload sufficient for starting up a cold plant.

The velocity of flow of steam of a greater pressure into an atmosphere of a less pressure, increases as the difference of pressure is increased, until the delivery pressure becomes 58% of the initial pressure. The flow does not, thereafter, increase by a further decrease of the delivery pressure, and increases very slowly by a greater initial pressure, because the density and the weight to be removed increase with the pressure.

If the inlet pressure is but 25 lbs. absolute, or 10 lbs. gage pressure, and the outlet pressure atmosphere, the condition of 58% delivery pressure is present and the velocity of flow through a converging nozzle is 863 ft. per second, resulting in a delivery of approximately 23 lbs. per minute per square inch area of orifice. Tests by the author on fractional valves indicated that they had an efficiency of orifice of about 60%. Applying this factor would indicate a delivery of about 14 lbs. per square inch area of orifice per minute, or sufficient steam for the normal supply of 2,800 sq. ft. of radiation with a reasonable allowance for the condensing effect of the piping system.

In the following table, the usual sizes of reducing valves are rated in accordance with the standard rating of steam mains, corresponding to the low pressure side of the valve. These ratings divided by 2,800 give the necessary areas through the valve seats for steam at 10 lbs. gage pressure to be reduced to atmosphere.

TABLE 1. RATING FOR THE USUAL SIZE OF REDUCING VALVES

Valve Size, in.	Rating	Seat Area, sq. in.	Diameter Double Seat in.	Usual Diameter Double Seat in.	Diameter Single Seat in.
1 x2	300	0.1	⅜	23-32	⅝
1¼x2½	500	1.18	½	⅞	11-16
1½x3	900	0.32	21-32	1 1-16	29-32
2 x4	2000	0.71	1.	1½	1⅜
2½x5	3600	1.29	1 5-16	1¾	1 13-16
3 x6	6000	2.14	1 11-16	2⅛	2⅜
4 x8	13000	4.64	2 7-16	2⅞	3 7-16
5 x10	23000	8.21	3¼	3½	4 9-16
6 x12	37000	13.2	4⅛	4¼	5¾
8 x16	78000	27.9	6.	5¾	8⅜

The fourth column gives the required diameter for double seat valves, while the fifth colmun gives the diameter commonly used. The sixth column gives the required diameter for single seat valves.

It will be seen from this table, that the area of seats as commonly made are amply large even at the unusually low initial pressure of 10 lbs. The necessary area of seats as given above may be divided by 2 if the inlet pressure is increased to 35 lbs. gage; by 3, if increased to 60 lbs; by 4, if increased to 85 lbs.

The friction drop for the high pressure supply main will vary with the pressure used, but it may be said to average approximately 1 lb. per 100-ft. run, with the pressures in ordinary use.

D. S. Boyden, in discussing the paper, stated that we have been very liberal in sizing reducing valves. He said he believed manufacturers should consider the points brought out in the paper with a view of establishing a more definite basis for sizing such valves.

H. M. Hart spoke of his practice in making twin installations of reducing valves. He said no reducing valve is manufactured capable of taking care of the wide requirements sometimes found. He also spoke of the different sizes of the openings and outlets of such valves and said he believed the outlet should be of the same size as the inlet.

J. H. Walker said that service connections in central heating work have to be of larger size than the main piping in the building so that as a rule the service connections are figured the same size as the inlet to the reducing valve.

A paper was then presented on "Industrial Uses of Superheated Steam," by Alexander Bradley, of New York.

In discussing Mr. Bradley's paper, Mr. Donnelly stated that before accepting the savings claimed for the use of superheated steam, at least for process work, it would be desirable to have the present losses pointed out in the use of saturated steam.

At this point the chairman introduced J. Irvine Lyle, chairman of the heating engineers' Research Committee to tell the members of the district heating engineers' association about the research bureau. Mr. Lyle pointed out that the results of the investigations would contain many matters of direct interest to district heating engineers and asked for the association's co-operation, not only in subscriptions but in submitting suggestions and data for the use of the bureau.

On resuming the chair, President Martin called for the report of the Rules and Regulations Committee on Standard Rules for Computing Required Radiation. This report was published, practically in full in THE HEATING AND VENTILATING MAGAZINE for JUNE, 1919. It was presented by H. R. Wetherell, chairman.

Mr. Wetherell called attention to a typographical error appearing in the report in connection with the formula for gravity straight steam systems having from 1 to 3 lbs. pressure. It was stated that the formula applied "per season 3-lb. gauge." This should read, "for steam, 3 lb. gauge."

A lengthy discussion followed the presentation of the report which was carried over to the Thursday morning session.

Morning Session, June 12.

Director John R. Allen of the heating engineers' Bureau of Research criticised the proposed rule on the ground that the heat loss does not depend on the volume of a room, but on the infiltration of air through walls and windows. He said he was glad to see a deviation from the coefficient of 1 for single glass, as he had been able to get great variations under different conditions. He thought 1.25 to be about right for single glass, 1.1 to 1.15 for plate glass and 0.75 for double glass, instead of 0.65. He said it was remarkable that we have no reliable tests on heat losses through present types of hollow tile.

Professor J. D. Hoffman said that any rule adopted would be a compromise. No infiltration rule, he added, is available, so that the present rule is the best we have and comes the nearest to what all can agree upon.

Mr. Boyden pointed out that the proposed formulas were not intended for use in designing heating systems, but were for rate-making purposes.

In closing the discussion, Mr. Wetherell said that it was practically impossible to get all of the members of the committee to agree to such an important matter as standard radiation rule, and it was his opinion that if two-thirds of the committee approved of the rules, this was sufficient to warrant submitting the rules to the association.

Regarding the adoption of the rules for use in all localities, it would not be feasible to have simplified rules that could be used to meet all classes of building construction and the varying conditions in a given locality. For example, it is not necessary to install as much radiation in buildings in the extreme North and in Canada as it is in the northern part of Illinois and Indiana, due to the better type of building construction in the extreme North. The same thing would apply to well-constructed buildings in any State or locality.

In connection with the standard rule for computing water radiation, adopted by the Indiana State Public Utilities Commission he quoted Mr. Myer's statement that it was necessary for all water heating companies operating in Indiana to use this rule. The rule adopted in Indiana, he admitted, is not the same as the rule proposed by the committee, but he held that it is the same type as Rule No. 1 and is a move in the right direction. Mr. Wetherell stated that it was his understanding that the Indiana commission recommends this formula for use, but does not insist on it.

As far as the Illinois commission is concerned, this commission has not adopted a standard rule for figuring

radiation, but it is getting very much interested in the subject. In fact, the commission retained Professor Hoffman to testify in a recent heating rate case to give his opinion as to a proper rule for determining required steam and water radiation. The rule submitted by Professor Hoffman is practically the same as the proposed Rule No. 1 under discussion.

The rule used by the Springfield company is the same form of rule as the one presented by the committee, but varies as to coefficients.

Mr. Wetherell maintained that the proposed rule was equally adaptable for rate making purposes and for computing required radiation.

Referring to Professor Allen's statement that the cubic contents should not be considered in figuring radiation, but rather the infiltration, Mr. Wetherell stated that several new theories on this subject have been advanced in the past few years, but to date none of them has proved more accurate than the old method of using the cubic contents. He then took up Professor Willard's statement that the air leakage in a room should be computed from the lineal feet of cracks around the doors and windows. He felt it was a question whether a method of this kind would take care of the air changes in a room having, for instance, a door which was opened and closed every few minutes during the day.

In the matter of the factor for plate glass, which Professor Allen thought should be the same as for single glass, Mr. Wetherell stated that there was a question as to this factor, as very few authorities give a factor for plate glass, and those who do show it to be less than for single glass. The factor used was, for this reason, made 20% lower than for single glass.

A motion was then adopted that the rules be put out by the association with the recommendation that they be used by the member companies until a better rule could be developed. At a later session this motion was reconsidered, owing to the fact that a formula for figuring hot water radiation had already been put out by the Indiana State Utilities Commission. The Bureau of Standards in Washington is also about to publish proposed rules for figuring radiation.

The final motion that was passed regarding the association's radiation rules was that they be put out as far as they concerned steam radiation, to be used by the members until further developments showed the advisability of modifying the rules.

EDUCATIONAL COMMITTEE PROPOSES ASSOCIATION HAND BOOK.

The feature of the Educational Committee's report was the recommendation that the association take steps to get up a hand-book of central station heating data.

In brief, the plan consists of compiling all data offered, on sheets of standard size; and in the future, of publishing all papers on the same size of sheet—all information to be thoroughly classified and indexed, so that it will be of real value to the men in the ranks, as well as to the engineers and managers of the heating utilities.

The suggestion has been made that such size of sheet shall be selected as is already in use, or will be used by other national associations—keeping in mind that the real value of any data of this sort depends not only upon the actual quality of the information, but also upon the form in which it is presented.

In other words, the data are of no value unless they are used, and to be used, they must be compiled so as to be quickly and easily accessible. The size of sheet and the form of the book in which it is bound, are both determining factors. It is felt that such a size of loose-leaf book can be selected that the information will be put to real use.

Upon inquiry of the Commercial Section of the National Electric Light Association, it was learned that the size of sheet they are using, namely 4 x 7 in., had proven to be very practical; also that the Westinghouse Electric & Manufacturing Company and the General Electric Company had adopted the same size for their salesman's handbooks—so that it would seem that this is about the right size which should be adopted for the handbook sheet.

The information contained in such a book could easily be kept up-to-date by the publishing of revised sheets which would supplement those already in use in case the original data became obsolete or in the case of publishing new sheets covering any new subjects or parts of subjects.

For simplicity in filing, the decimal system has many advantages. With it all that is necessary is to arrange the sheets in simple numerical order.

The committee's report also discussed methods of turning on steam in large lines, and moisture in steam, but these topics were overtopped in interest by the proposal of an association handbook.

While the discussion was going on, the chairman called upon the report of a committee named at the opening session to consider this and other points in Secretary-Treasurer Gaskill's report. Mr. Boyden, who reported for the committee, recommended the appointment of a special committee on handbook. The other recommendations, all of which were adopted, provided for the continued publication of the Proceedings, the publication of the association's Bulletin quarterly "or more frequently," a membership campaign to be conducted by a special committee, and the creation of a Class C membership designed especially to take in college students.

Morning Session, June 13.

The following committee appointments were announced at the opening of the final session, Friday morning:

Committee.	Chairman.
Membership	D. L. Gaskill
Heating Research	J. A. Donnelly
Rules and Regulations	H. R. Wetherell
Underground Construction	A. C. Rogers
Accounting Committee	A. D. Spencer
Public Policy	D. L. Gaskill
Station Operating	F. B. Orr
Meters and Accessories	R. C. March
Educational	J. H. Walker

The report of the Underground Construction Committee was then presented by A. C. Rogers, chairman. Mr. Rogers characterized as an interesting part of the report a paper by N. W. Calvert of the Detroit Edison Company, which takes up the matter of distribution and its different aspects in connection with high-pressure mains.

(Mr. Calvert's paper will be published in next month's issue.)

Other items covered in the report of the Underground Construction Committee were a contribution by W. I. Biebesheimer describing underground construction in his territory and an account by the chairman, A. C. Rogers of the conditions in Toledo in January, 1918, during the flood period, with special reference to the difficulties experienced by the heating company in operating its plant.

In discussing the report Professor Hoffman brought up the point that in figuring line loss much depends on how it is figured, whether as the ratio of the B. T. U. lost to the total B. T. U. or to the available B. T. U. On the first basis, the line losses would run fairly low, but on the second basis, they would be apparently high.

J. H. Walker stated that line losses should be figured in pounds of steam which would avoid this difficulty.

Professor Hoffman stated that the B. T. U. method would have to be used in connection with water heating. He thought a better basis would be efficiency of insulation.

J. C. Hobbs stated that the factor of the period of operation should also be considered, as operation in the summer time or in mild weather would give a larger percentage.

CORROSION PROBLEM IN CENTRAL STATION HEATING.

F. N. Speller then presented a paper on "The Corrosion Problem in Central Station Heating Systems." Mr. Speller said that the present theory of corrosion is that iron is soluble in water to a slight extent. He then discussed the methods used by the company, notably in a bath house installation in Atlantic City for deoxiding the water which practically put a stop to the corrosion of the piping. Mineral oil in the piping of exhaust steam heating systems he said, has kept such piping from becoming corroded.

Mr. Rogers mentioned, as the three processes of corrosion, electrolysis, the

building up of the interior of the pipe with scale and pitting of the interior of the pipe. He called attention to the fact that frequently only some parts of a main are affected and asked the cause of this variation.

One of the speakers brought up the point that deoxidization will not remove all chances of corrosion, but only a certain percentage, and he argued that the additional expense involved in using wrought-iron pipe would be repaid in the longer life of the pipe.

In reply Mr. Speller stated that it was probably not necessary to prevent entirely the corroding action as the present developments had served to eliminate this trouble for all practicable purposes.

METERS AND ACCESSORIES.

The final report was that of the committee on Meters and Accessories which was presented by the chairman, J. H. Walker. This report was divided into three sections. The first section described a recording instrument, used in connection with a condensation meter, to obtain an approximate load curve of a building. The second section was a tabulation and discussion of the troubles which have occurred in traps of various types, the data being compiled from the experience of several operating companies covering the period of one year. The third section described a method used by a member company of connecting several condensation meters in parallel. The second and third sections of the report are presented herewith:

An Analysis of Steam Trap Troubles, by L. E. Croup.

There is hardly any other steam specialty about which so little is known, and which is so much abused as the steam trap. Traps are usually considered as a necessary evil, and as a rule, very little care and attention are given to them. This should not be the case, for the importance of the trap, as regards its effect on proper metering and the large amount of steam that can be wasted by it, can not be overlooked. Traps, when allowed to be disregarded and forgotten, soon cause trouble and start to waste large amounts of steam. The three main causes or trouble makers are, (a) valves becoming worn, (b.) dirt and scale clogging the traps, and (c) valve mechanism becoming loose. Accompanying the report was a table giving an analysis of steam trap troubles with different makes, compiled from data contributed by four member heating companies and covering a period of one year for most of the records.

The largest number of troubles reported, being 31% of the total, was caused by the valve being worn and the trap blowing steam. Some valves wear quicker than others, due to the kind of metals used, and sometimes, because of the construction of the trap, they are not tight and never were tight. The trouble usually starts when the valve becomes loose or clogged with dirt, allowing steam to be blown through the trap. When this starts, wire-drawing will tend to set in and conditions rapidly grow worse. Often vapor from the condensation makes one believe the trap is blowing steam. This can easily be determined if the trap has a water column, for if the column shows that the valve is water sealed, it is not blowing steam.

Dirt and scale clogging the valve mechanism, together with the valve seat being filled with dirt, caused approximately 25% of the total number of troubles. Even on installations that have been in service ten years or more, it has been found in several instances, that mud and scale are still being returned into the trap and then into the meter. The particular traps referred to have to be inspected and cleaned out several times a year. This causes much loss of time and delay in disconnecting and cleaning the trap which could be saved if strainers were used. Not enough emphasis can be made as to the necessity of using strainers on all installations, especially new ones.

The next largest source of trouble is loose valve mechanism. All parts of traps that are liable to wear, such as pins and bearings, should be made of metal which has the best resisting qualities for wearing, and should have the proper amount of reinforcing. Where screwed parts are used, some locking device should be provided, as they invariably work loose otherwise.

A large number of floats were found

leaking and this was no doubt due to faulty workmanship. Many traps were found to be sticking, due, no doubt, to dirt and scale clogging the valve mechanism. This only emphasizes still more that strainers should be used. The number having the valve seat worn was comparatively small, and was no doubt due to the same conditions as described under worn valves. Nearly all of the miscellaneous causes reported were due to air-bound traps. When a trap is air bound it has a tendency to retard the flow of condensation, or even stop it. This, of course, is not a fault of the trap and should not be charged against it. Air binding is liable to happen on any heating system. Automatic air vents should be used, and most traps are fitted with them by the manufacturer.

CUSTOMERS' COMPLAINTS.

It is interesting to note the number of customers' complaints that were due to trap troubles. Out of a total of 243 troubles, 218 caused complaints. Nearly all of these could no doubt have been prevented by more frequent inspections, thus giving the customer better service. This fact shows very clearly that it has been a fault of the heating companies to practically disregard the trap until attention is called to it by a complaint from the customer.

In conclusion of this subject, the following recommendations are submitted:

CARE OF STEAM TRAPS.

1. In order to have proper meter operation and at the same time give the customers more satisfactory service, all steam traps should be overhauled at frequent intervals. A routine of trap inspections should be established, and if a trap is found blowing steam, it should be examined at once.

2. That the Rules and Regulations Committee include in their report an item making it necessary for customers to install strainers ahead of the traps, and that the customer be held responsible for keeping the strainer clean and in proper working order.

SELECTING THE PROPER SIZE OF TRAP.

3. Steam traps should be selected with reference to their capacity for handling condensation at the pressures they are to operate under, as there are too many failures when based on the catalogue rating of lineal feet of radiation, and on the size of the pipe connections. All traps should be rated by their capacity for discharging condensation at various pressures, and it is safe to say that it will not be very long until all the manufacturers will adopt this method. Traps should not be compared by prices only, for the highest-priced trap may be the cheapest when compared on the basis on the cost per unit weight of condensation discharged, other conditions being the same. A steam trap should be selected large enough so that it will take care of the maximum demands at the minimum pressure which is liable to exist during coldest weather, for these conditions usually come at the same time.

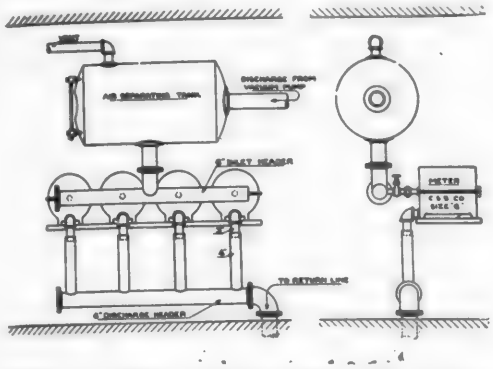
An Efficient Meter Installation for Large Buildings, by L. E. Croup.

In the case of large office buildings, hotels, etc., it is often found necessary to install from three to five condensation meters to take care of the maximum demand or else to have a special meter made, large enough for the entire job. The advantages of using several meters are many. Most buildings use a small amount of steam during the summer months for water heaters, etc., and greater accuracy can be maintained by using a small meter rather than a large one. It has been proven by tests, that meters nearly always have a greater error when the load is small. Increased accuracy can be maintained by the use of two or more meters, because of the fact that the effect of a possible large error in a single meter is diminished. When one of the meters stops registering, the method of estimating can be made much easier, from the fact that each meter is an installation of this kind registers practically the same percentage of the total condensation at all times. The accompanying sketch shows the method used by the Duquesne Light Company, which has been made a standard for installations of this kind.

On vacuum heating systems, it is necessary to have a storage tank ahead of the meters, which at the same time

serves as an air-separating tank, for if the air is forced through the meters, their accuracy of registration will be affected. The tank also allows the condensation to flow by gravity to the meters and eliminates the chance of putting a pressure on them. The installation can be located at a high enough elevation to allow the condensation to flow back to the plant when so desired.

Both inlet and discharge headers are made in one piece with welded nipples, which minimizes the number of fittings necessary and chances for leaks. The outlet pipe from the meter is extended loose into a larger nipple in the discharge header. This is done for two



TYPICAL METER INSTALLATION FOR LARGE BUILDINGS.

reasons. It greatly reduces the work when it is found necessary to remove a meter for testing or any other purpose; it makes sure that all condensation will flow away from the meters, and not back up into them in case the return line should become clogged or stopped up in any way. The return line should always be well vented, for if any air collects in pockets in the line, much trouble will be experienced. This method allows the condensation to overflow at the meter outlet, and therefore, does not affect their operation. For such emergencies it is advisable to have a sewer drop close to the meter installation.

In the discussion Mr. Hobbs presented a description that had been sent to him as chairman of the Educational Committee of a new development in steam meters designed by F. E. Pendleton in the form of an integrating register for the St. John steam-flow meter.

In discussing the use of injectors, J. H. Walker mentioned the fact that in Detroit the company has ruled that no city water should be mixed with condensation water. He brought down the house by declaring that some injectors "have no sense of their duty at all."

Speaking of the arrangement of several condensation meters instead of one large one, it was brought out that this was the practice followed by several companies, although in most cases it was done where the largest available condensation meter was not large enough to take care of the installation.

The final action of the convention was the election of officers, which resulted as follows:

NEW OFFICERS.

President, J. C. Hobbs, Pittsburgh, Pa.

First Vice-President, J. L. Hecht, Chicago, Ill.

Second Vice-President, J. H. Walker, Detroit, Mich.

Third Vice-President, E. L. Wilder, Rochester, N. Y.

Secretary-Treasurer, D. L. Gaskill, Greenville, O.

Executive Committee: George W. Martin, New York; F. B. Orr, Chicago, Ill.; and H. R. Wetherell, Peoria, Ill.

(Convention report continued on Page 50.)

Report on Industrial Reconstruction Problems.

The publication is announced of a complete report of the proceedings of the National Conference on Industrial Reconstruction Problems, which was held in New York, March 18-21, last, under the auspices of the Society of Industrial Engineers. The book contains 300 pages and sells for $2.00 net. It is published by the Society of Industrial Engineers, at 327 La Salle St., Chicago, Ill. Included in the contents is a paper on "The Engineer's Place in Reconstruction," by L. P. Alford, editor of *Industrial Management*, and one on "The Need for the Engineer's Viewpoint in Industry," by Norman A. Hill, general manager of Carriage Factories, Ltd., Toronto, who will be remembered as a speaker at former meetings of the heating engineers' society.

Visit to National Tube Works the Big Feature of the Entertainment Programme.

While the ladies were royally entertained by the local chapter of Pittsburgh and, in the case of the National District Heating Association, by the asociation's local members, several of the entertainment trips were arranged for the entire membership of each convention. For instance, on the opening day of the convention, after the heating engineers' meeting at the Bureau of Mines, they were joined by the members and their ladies from the district heating engineers and partook of dinner at the Bureau of Mines, afterwards going in a body to the theatre at the Carnegie Institute of Technology, where they witnessed "Twelfth Night," given by the students of the School of Dramatic Arts.

The following day, the ladies were taken on an extensive automobile trip through Schenley Park and thence to the Heinz Preserving Works. Luncheon was served at the works, in which Heinz specialties formed an important part of the menu. The party then proceeded to the country home of G. C. Blackmore, of the National Radiator Company, at Edgewood, where afternoon tea was served under the trees.

In the evening both convention parties again met at the Pines, a resort outside of Pittsburgh, where a chicken and waffle dinner was served. After the heat of the city, which, by the way, continued throughout convention week, the refreshing country breezes of the Pines proved most welcome. Following the dinner, dancing was in order and the time of departure of the convention "special" came all too soon after so delightful an evening.

When the time came for the boat ride to the National Tube Works, Thursday afternoon, there was a general air of expectancy, in spite of the fact that many had previously had the experience of visiting the works.

Arrangements were made to sail up the Monongahela River on the Sunshine to the company's MeKeesport Works. The boat left the foot of Wood Street. The first view of the river gave to many their first glimpse of the Mississippi type of rear-paddle steamer. Many, too, had their first experience in passing through a lock, which brought the Sunshine to the upper level of the river.

A sudden burst of whistles and sirens from the shore announced the fact that the boat was passing the Continental Works of the National Tube Company. Many expressions were heard that the welcome gave the party all the sensations of returning soldiers entering New York harbor.

After a delightful ride of two hours the McKeesport Works were reached, a special landing place having been arranged for the convenience of the party. After taking a group picture, the party started at once on a tour of inspection which took in all of the principal operations, from the blast furnace to the finished pipe and sheets. The party watched with special interest the manufacture of "Spellerized" steel sheets, the process being explained by Frank N. Speller, the company's metallurgical engineer, who originated the process.

After a busy hour or more the party returned to the boat where they found a buffet dinner ready.

The next day, Friday, after the close of the National District Heating Engineers' convention, a party was made up to visit the works of the Westinghouse Electric & Mfg. Co., at East Pittsburgh. On their arrival at the plant they were met by guides and a profitable afternoon was spent looking over the varied process of manufacture required by the company's extensive line. Before starting the party was urged to complete its inspection before the close of the working day so that they might avoid the crowds of workmen returning from the plant. The force of this suggestion was appreciated when it was learned that the Westinghouse employees alone number 10,000.

The entertainment committee was composed of representatives of the Pittsburgh Chapter of the heating engineers' society and of members of the district heating engineers' asociation. It was made up of Professor S. E. Dibble, Spencer Brittain, C. W. Wheeler, J. C. Hobbs, Elmer B. Plapp, George C. Blackmore and C. C. Choffin.

Among the Exhibitors at the N. D. H. A. Convention.

Bailey Meter Co., Cleveland, O., had a display of types of fluid meters and boiler meters, steam flow, high and low pressure. The company was represented by E. G. Bailey and G. D. Conlee.

Tyler Underground Heating Systems, Pittsburgh, Pa., showed a number of specialties, including a double-expansion joint with guides and anchors, a thimble expansion joint with guides and anchors, condensation meters, high-pressure steam traps and a combination float and vacuum trap for blast systems. Those on hand for the company were E. B. Tyler and W. I. Staaf, shop superintendent. Mr. Tyler stated that the company was about to put

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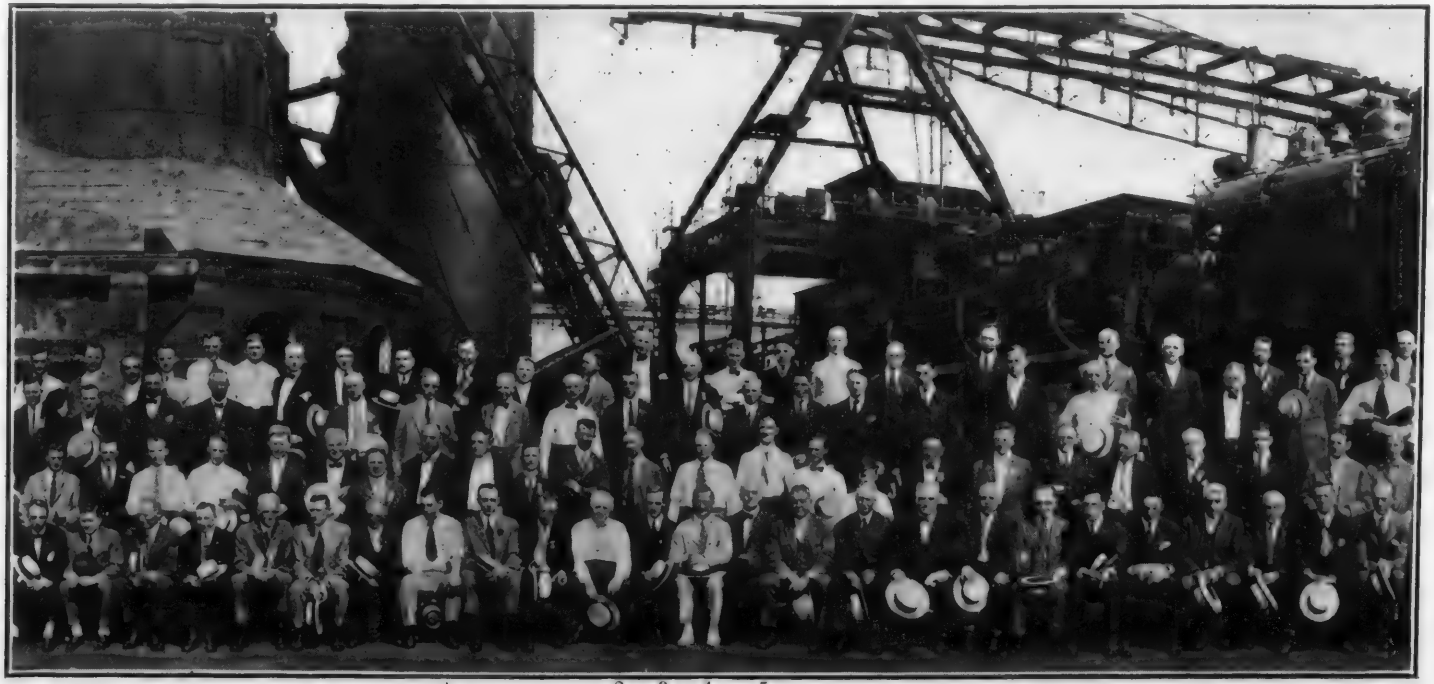
RIGHT PORTION OF GROUP.



1 2 3 4 5

1. President J. C. Hobbs. 2. Secretary Gaskill. 3. President Martin. 4. President Timmis. 5. Director Allen.

MEMBERS OF AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS AND NATIONAL DISTRICT HEATING ASSOCIATION AT MC KEESPORT WORKS OF NATIONAL TUBE COMPANY.

on the market a new device that would be of special interest to heating engineer.

Taylor Instrument Cos., Rochester, N. Y., had an exhibit comprising an angle hygrodeik and angle thermometers for air ducts; also recording thermometers and recording pressure gauges. The company was represented by E. C. Campbell, Pittsburgh, representative.

Keasby & Mattison Co., Ambler, Pa., showed several forms of magnesia and hair-felt pipe covering. Samples of crude asbestos from the company's mines in Canada were distributed. W. H. Grable and W. C. Landis were in charge of the exhibit.

Celite Products Co., Pittsburgh, Pa., had an interesting demonstration showing the way Sil-o-cel stands up against high temperatures. A blow torch was in operation directed against a section of boiler wall construction insulated with Sil-o-cel powder. Thermometers were inserted on the opposite side showing the small heat loss. A similar demonstration was given with Sil-o-cel brick. E. J. Dickman, of Pittsburgh, who was in charge, stated that Sil-o-cel, which is a light-weight, highly siliceous insulating material, is made in the form of bricks, blocks, powder and cement for various insulating purposes.

National Air Cell Covering Co., Jersey City, N. J., had an exhibit consisting of a sample section of Pyrobestos pipe covering, also a sample section of Pyrobestos stack lining. Pipe guides used in the company's method of underground construction were also shown. G. C. Hall, who was in charge, came in for many congratulations on his election as secretary of the National Air Cell Covering Company.

A. M. Byers Co., Pittsburgh, Pa., had an impressive exhibit of standard weight, extra-heavy and double extra-heavy genuine wrought-iron pipe, also Van Stone joints of black and galvanized genuine wrought-iron pipe and coils and bends. A. J. Fitzgibbons was in charge of the company's interests.

American Foundry & Construction Co., Pittsburgh, Pa., showed a 4-in. expansion bend, a 4-in. cast-steel flanged gate valve, an 8-in. cast-steel flanged elbow and a stock of assorted flanges and samples of Van Stone joints. The company's representatives were W. S. Klingelhofer, president; F. W. Hiles, purchasing agent; and E. Johnson.

Ric-Wil Co., Celeveland, O., exhibited a model of a cross-section of Class DF and Class MDF Ric-Wil conduit and a large base drain for underground steam and water pipes. The display also included Cortescopic views of Ric-Wil jobs under construction. Ric-Wil paint for heated surfaces formed an interesting part of the exhibit. The company was represented by Ira D. Siegfried and C. Gottwald.

Republic Steam Flow Meters Co., Chicago, Ill., had two meters on exhibition, the regular type and one which the company has just placed on the market. The latter model is designed for measuring fluid flows of extremely low velocity and low pressure, 1 in. of water differential being sufficient to actuate the mercury column 1½ in., or the entire range of the meter. This meter was connected to an Ellison draft gauge to demonstrate its sensitiveness. A Type E panel board, showing the graphic recording and integrating instruments was mounted in the booth, while an indicator was connected at some distance, demonstrating the flexibility of instrument arrangement. Also on exhibition was a new, non-clogging Pitot tube, which the company is featuring. Those present were J. D. Cunningham and S. A. Reinhard of the home office, and E. A. Ehmann, of the Hogan Corporation, the company's Pittsburgh representatives.

Central Station Steam Co., Detroit, Mich., had on exhibition one of its condensation meters in operation. The meter was provided with a glass front to permit its being observed under actual working conditions. Those representing the company were J. V. Redfield, president and manager; D. T. Wallace, manager of the company's Minneapolis branch; and W. R. Owen, of the Detroit factory.

American District Steam Co., No. Tonawanda, N. Y., displayed numerous models of its line of central station heating devices, while the company's supply of engineering bulletins was soon depleted by those who were aware of the valuable data contained in them. Particular interest centered in the first showing of the Pendleton integrating register for the St. John high-pressure steam flow meter. At the head of the company's delegation was H. C. Kimbrough, secretary, who brought the interesting information that C. R. Bishop has retired as secretary and general manager of the company after a service of 30 years. Mr. Bishop expects to go into other manufacturing lines. He is succeeded as secretary by Mr. Kimbrough. Others present were Walter J. Kline, sales engineer; Eugene L. Barnes, formerly of the company's Seattle office, now in charge of new devices for the company, with headquarters at North Tonawanda.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., had a display of disc fans and household utility electric heating devices. Many of the delegates found the

refreshing breezes of the fans an added attraction to this booth as the temperature hovered around the 90° mark most of the time.

Armstrong Cork Co., Pittsburgh, Pa., had on exhibition a full-size model, showing the company's method of insulating underground steam lines with Nonpareil high-pressure covering, together with samples of Nonpareil high-pressure covering, blocks and cement; also insulating brick and a small model showing how this material is applied to boiler settings. Another product that attracted attention as Linotile for the floors in offices, residences, etc. S. L. Barnes was in attendance.

General Electric Co., Schenectady, N. Y., displayed a G. E. electric-recording integrating steam, water and air-flow meter, a G. E. large-dial indicating steam, water and air-flow meter, a G. E. steel flow nozzle for measuring steam, a G. E. bronze flow nozzle for measuring water and a cross-section G. E. nozzle plug. The company was represented by R. E. Wooley, manager of the meter department.

Pittsburgh Valve, Foundry & Construction Co., Pittsburgh, Pa., showed a 6-in. cast-steel monel mounted balanced angle-valve, with long-radius cast-steel ell, also a 180° pipe bend with steel Atwood joint flanges and a 14-in. header, with 6-in. interlock welded neck, one end of the heater being swedged down to 12 in. The interlock neck weld is the company's patent method of welding necks and is done in such a manner that the neck is not dependent on the welding, but rather on the wrought material. The swedging, it was stated, offers a simple and economical method of reducing the size of the header by eliminating a cast reducer and the extra joints necessary where a reducer is used. The company's representatives were J. D. Robertson, R. B. Felker and W. H. Arnold.

H. W. Johns-Manville Co., New York, showed samples of underground pipe insulation, Asbesto-sponge felted insulation, 85% magnesia insulation, high-temperature cement, Vitribestos stack lining and thermo fire felt sheets. The exhibit also included a J-M steam trap. The company was represented by L. B. McMillen, engineer, of the New York office, and Eugene Dowling, manager of the Pittsburgh branch insulation department.

National Tube Co., Pittsburgh, Pa., exhibited samples of National wrought pipe in sizes from ⅛-in. to 30 in. O. D., inclusive; also National pipe for bends and coils; lap-welded and seamless steel boiler tubes, Matheson joint pipe for water mains and National pipe with Van Stone joint. Those present in the interests of the company were F. N. Speller, W. L. Schaeffer, J. J. Cain, J. M. Denney and Walter A. Peterson.

American Engineering Standards Association Formed.

The wide scope of the interests involved in the work of the standardization committee formed by the four leading engineering societies and representatives of the War, Navy and Commerce Departments, is indicated by the move to change the name of the committee to the American Engineering Standards Association.

The objects of the association are:

1. To unify and simplify the methods of arriving at engineering standards, to secure co-operation between various organizations and to prevent duplication of standarization work;
2. To promulgate rules for the development and adoption of standards;
3. To receive and pass upon recommendations for standards submitted as provided in the rules of procedure, but not to initiate, define or develop the details of any particular standard;
4. To act as a means of intercommunication between organizations and individuals interested in the problems of standardization;
5. To give an international status to approved American engineering standards;
6. To co-operate with similar organizations in other countries and to promote international standardization.

Means are provided for increasing the number of representatives in the association by invitation or on request. Several important organizations interested in standardization will be invited to appoint representatives as soon as the necessary power is obtained.

Organizations may ask the association to approve standards which they have formulated, or to approve committees that they have appointed, and by so doing becomes a sponsor society. At the request of the sponsor, approval of the standards is given when they are the substantially unanimous conclusions of the association's sectional committee.

In the past, it is pointed out, there have been many occasions when two or more organizations have formulated standards for substantially the same thing. The American Engineering Standards Association will furnish a means by which any organization intending to define a standard can readily ascertain what others are interested and should be consulted in regard

to it. The association is authorized to call a meeting of those who would be interested in the formulation of a new standard or the revision of an old one, and to select one or more sponsor societies. The sponsor societies will then appoint a Sectional Committee to formulate the standard and report to the sponsor. The sponsor may then request the association to approve.

The association deals only with the sponsor and acts only at its request. Provision is made in all publications that a standard must be referred to as that of the sponsor, using whatever title the sponsor has given to it, followed by the statement "approved by the American Engineering Standard Association." The approval may be given in one of three ways, as "recommended practice," tentative standard," or "standard," the expectation being that nothing will be approved as standard until it has been shown to be generally acceptable.

ANNUAL CONVENTION OF MASTER STEAM FITTERS PREPARES FOR READJUSTMENT PERIOD

Cost System, Radical Boiler Legislation and Trade Extension Bureau Principal Topics of Meeting.

A feeling that the worst is over in the trials that have beset the heating contracting trade during the war and the hope and expectation of better things to come pervaded the annual meeting of the Heating and Piping Contractors' National Association, which was held in Atlantic City, June 12-14. This organization, which was formerly known as the National Association of Master Steam and Hot Water Fitters, met this year for the first time under its new title.

President Edmund Grassler struck the keynote of the meeting which opened Thursday morning at the St. Charles, when he said:

"We have been passing through a period of great unsettlement. The war has sent its disturbing shock through every phase of social and business life. In every department of our business we find that things are still far from normal. But, bit by bit, the rough places are smoothing down and we are getting nearer to our natural stride. Things will never again be just as they were. We are finding it necessary to make provision for some sort of readjustment all the time to adapt old customs to new ideas. But we are getting there, and I, for one, look confidently forward to a state of all-round betterment. It will come as sure as the sun shines. When we are once through with the troublesome period of readjustment that is now under way we are going to have such a flood of prosperity as the world until now has never known—and we'll get our share of it."

President Grassler opened his address by stating that in spite of abnormal conditions which have harrassed our business as much as any during the past few years, the asociation's membership is greater than it was a year ago. He referred especially to the augmentation in the strength of the association through the affiliation of the Chicago and Cleveland associations with the national body. He stated that the association was also in a more prosperous condition, financially, than ever before.

On the subject of association work in general he said:

"More and more, as the years go by, the ever present and broadening value of such an organization as ours is impressed upon us. More and more we come to appreciate the greater value

each member of it receives from its concerted effort than any individual effort could ever attain. The measures tending to eliminate unfair competition; to secure the enactment of just legislation in matters affecting our business interests; the more comprehensive and definite knowledge of labor conditions and tendencies, of market prices for materials, of freight rates and shipping regulations, the interchange of experiences as to shop rules, working conditions and prices, and the more accurate understanding and wider application, every season, of how to properly adjust costs, overhead expenses, etc.—all of these and innumerable ramifications of each of them, are brought to the understanding of every member in a manner that no single member who relied upon his own efforts alone could ever accomplish. And it is not in these respects alone, great as they are, that the value of the organization is most apparent, but in its fostering of the sense of fellowship and kindred, instead of antagonistic interests.

"I think it is in order for me at this time to place especial emphasis upon one of the points to which I have just now referred. That is the need of a comprehensive, workable and efficient cost system. I am not advocating any particular system—for it always seems as if a public recommendation in any matter of the kind imbues some of the hearers with a suspicion that the man making it has an ax to grind. Some methods are inevitably better than others, but what may be best for one man may not be best for another. There is, however, far too much of an inclination to rely upon the old-fashioned, rule-of-thumb method of computing costs and prices, and it is both fallacious and costly. The installation of any recognized system, even if it be not the best, will be better than none; and without it no business man will ever know exactly where he stands, or what percentage of profit or loss his business, or any section of it, means to him.

"This one thing alone, if it could be once brought into general use, would do more than anything else to do away with one of the most unsettling and destructive evils with which we have to contend—that of cut-throat competition. The man who recklessly underbids on a contract—that is to say, makes a low bid (or any other sort of a bid, for that matter), without having figured out how his costs for material, freight, labor, overhead expense and so on are going to work out is simply taking a blind and foolish gamble. He is an agent of demoralization who influences for evil both the business and its customers. He is cutting his own throat as well as his competitors', but it is remarkable to note how hard it is to make some men believe it.

"It is not alone sufficient to be up-to-date in your methods of cost-finding, distribution, sales-management and so on. It has to be borne in mind, that all of these, in the last analysis, are dependent upon another factor—reputation based upon quality of goods and service."

Apropos of standardization, President Grassler stated that "it is most desirable to develop a standard form of contract. It has been much discussed and often longed for."

Turning to the subject of legislation, he said:

"A very important matter to which I have made incidental reference was that of legislation. Some most pernicious attempts have been made to introduce bills the sole purpose of which seemed to be to impose heavy and utterly needless expense upon householders who used low-pressure steam or hot water heating systems by requiring the employment in such cases of licensed engineers. The preposterous foolishness of employing a skilled and high-salaried engineer to run a system which might only call for a 10-lb. pressure, or therabouts, is obvious; but it was only by the concerted efforts of this association and the National Boiler and Radiator Manufacturers' Association that we were eventually able to enlist the cooperation of some legislators who could aid us to get the matter settled on a common-sense basis by exposing the mischievous absurdity of the bills."

Discussing the labor situation, President Grassler stated:

"In the conflict of interests with which we are now contending the stand taken by labor merits especial attention. In general it may be said that most of the larger and more powerful unions, though they are loud is disclaiming any affiliations with Socialism, show a decided radical trend. This is the more important to consider, in view of the fact that many of them have, or are forming, organizations which are of national scope and have freely shown that they can exert considerable political pressure when they think occasion calls for it.

"Between employer and employee there has always yawned a chasm of mutual mistrust and misunderstanding. That chasm has never been safely bridged and only by the combined efforts of both, inspired by a spirit of mutual toleration, can it be.

"It would be both foolish and idle of be to propound any definite method of settling the labor question. All we can do to aid is to avoid the farmulation of any hard-and-fast method which takes no account of the ever fluctuating conditions with which we have to deal, but so handle our side of the question as to demonstrate that our sole aim is to be fair to both sides. To show, by whatever means we may, that we have as full respect for labor's legitimate rights, as we claim for our own, and to do our best to make it clear that mutual forbearance and consideration will count for more in the long run than all the evil-breeding suspicions, and that aggressive intereference with another man's law-abiding freedom of opinion and action is only imposing a wrong, which labor should for its own true interests be first to avoid."

DISCUSSION OF IMPROPER BOILER LEGISLATION

After the taking of the official photograph of the convention, an important address was delivered by Frederick W. Herendeen, representing the National Boiler and Radiator Manufacturers' Association. Mr. Herendeen spoke at length on what he termed the danger of pernicious legislation regarding low-pressure boilers. This has taken the form of bills introduced in several of the State legislatures providing for the compulsory employment of licensed engineers for their operation. Mr. Herendeen said that much of this kind of proposed legislation had been prevented through the activity of the heating and piping contractors' association and of the National Boiler and Radiator Manufacturers' Association, but that there was need of constant vigilance to prevent renewed efforts for the passage of radical laws.

Mr. Herendeen cited a typical case where a bill provided that all boilers with 10 sq. ft. of grate surface or more should be operated by licensed engineers.

He said that copies of all bills pertaining to boiler manufacture and operation are secured by the National Boiler and Radiator Manufacturers' Association, so that the association is able to keep fully informed as to such legislation and to take prompt measures to combat it. Mr. Herendeen urged the members to continue their efforts towards preventing the enactment of unnecessary and injurious boiler laws.

TRADE EXTENSION BUREAU.

The activities of the Trade Extension Bureau were presented by William J. Woolley, chairman of the bureau's Publicity Committee. After outlining the formation of the bureau, he said the success of the project is now assured. He declared that the possibilities in the heating and plumbtrades were far beyond the level that had been reached in either industry. The bureau's principal work will be in connection with providing publicity for modern heating and plumbing equipment. For the first year's work $50,000 is needed, $30,000 of which has already been subscribed.

One of the important features of the bureau's plan, he said is the standard order sheet, to be used by journeymen in reporting opportunities for business. The bureau is also developing a system of follow-up estimates and will

issue standard contract forms. It is also proposed to go into the matter of credits and collections. The plans provide, in addition, for a National Sales Week of heating and plumbing equipment, to be featured by special window displays and other selling ideas.

The convention then went into executive session.

ASSOCIATION REPRESENTED IN WAR WORK.

In the report of the board of directors, which was presented by N. Loring Danforth, reference was made to the important work of the association's War Service Committee during the past year. This committee was in frequent conferences with Government officials and was able to co-operate with effectiveness in obtaining proper priorities and in overcoming many of the difficulties that arose in connection with the Government's many contracts in which pipe fitting was involved. The report stated that the association had invested in all five of the Liberty Loans.

The report of Secretary Henry B. Gombers gave in detail the status of the membership, with statistics as to its distribution. He referred to the numerous conferences with Government officials and declared that the association had bright prospects for continued growth and for increased service to its members.

W. T. English, chairman, reported for Committee on Standardization.

RELATIONS OF EMPLOYERS AND EMPLOYEES.

A feature of the Saturday morning session was an address by W. G. Merritt, counsel for the Anti-Boycott Association. Mr. Merritt predicted a crisis in certain legal phases of the labor question. He declared against the boycott and urged more harmonious relations between employer and employee. He expressed the opinion that the failure of politicians to stand up for the right in the settlement of labor disputes to be one of the greatest problems now facing the industrial world.

The election of officers, which took place at the final session Saturday afternoon, resulted as follows:

NEW OFFICERS.

President, William H. Oakes; vice-president, J. E. Rutzler; treasurer, Earnest T. Child; sergeant-at-arms, John T. Bradley. Directors: H. G. Black, W. B. Van Sickle and F. H. Meadows.

The newly-elected officers were installed with due ceremony by Past President Stewart A. Jellett.

Resolutions were adopted favoring the present daylight-saving law. Following the customary votes of thanks, including one for the trade press, the convention adjourned.

Trade Extension Bureau Elects New Officers.

Further impetus was given the work of the Trade Extension Bureau at its meeting in Atlantic City, June 16, when thirty-five representatives of the allied associations were present. At this meeting new officers of the bureau were elected as follows:

President, Frank B. Lasette, New York; vice-president, A. M. Maddock, Trenton, N. J.; treasurer, L. C. Huesman, Evansville, Ind.; secretary-manager, William J. Woolley, Evansville, Ind.

A constitution and by-laws were presented for adoption and referred for final editing, to a committee composed of Joseph F. Evans, J. S. Cassidy and C. V. Kellogg.

Mr. Wooley reported that subscriptions had been received totalling $28,155.

Following the meeting the finance committee continued in session to consider plans for launching the bureau's campaign which will include bookkeeping and cost systems, sales campaign weeks and other activities.

At a previous meeting of the Trade Extension Bureau, held in Chicago May 23, Mr. Woolley reported that more room was essential for the work of the bureau and he was authorized to secure larger quarters in Evansville, Ind., where the bureau's headquarters are located.

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WE INAUGURATE in this issue the publication of an "Engineers' Specification Index," made up of advertisers in THE HEATING AND VENTILATING MAGAZINE. In compiling this index it was a matter of surprise to find that no other single index comprised a complete listing of the apparatus and devices used in heating and ventilating work. Every effort has been made in the list here presented to cover the items that properly come within the range of the heating engineers' activities. It is our desire to make this list thoroughly comprehensive and reliable and we will consider it a favor to be informed of any corrections or additions that are needed to make it of the utmost service to our readers.

It is a matter of gratification to be able to state that in the manufacturers' announcements appearing in the advertising columns of THE HEATING AND VENTILATING MAGAZINE will be found the names of the makers of every type of device used in the heating and ventilating industry, so that both the designing and contracting engineer can feel assured that in scanning the advertising pages they will be able to find the maker of any particular kind of device they are looking for in their line. The advantage of this will be appreciated, we are sure, by both reader and advertiser, and completes a cycle of service and co-operation that should be and is the goal of every representative trade journal.

We take this opportunity of expressing our very keen appreciation of the support on the part of the entire industry that has made this achievement possible. We are not, however, unaware of the added responsibility involved, although this is lightened to no small extent by the knowledge that the industry is fairly on the crest of the wave of Progress and that its ship is being piloted by competent hands.

IT IS apparent that a serious effort to establish engineering standards on a broad scale is being attempted in the formation of the American Engineering Standards Association, made up of representatives of the four principal engineering societies, and representatives of the War, Navy and Commerce Departments. The plan of action, as outlined on another page, would seem to fit in very well with that of the heating engineers' Research Bureau which will take up, as its first work, the formulation of heating standards. This sort of co-operation would, at least, prevent the kind of situation that has arisen with the district heating engineers in establishing radiation formulas, where it was found that other bodies had already established, or were about to establish different standards for the same thing.

MODERN PRACTICE IN VAPOR HEATING

EDITOR'S NOTE: *For the purpose of this series of articles, a vapor, vacuum, vapor-vacuum, vacuum-vapor, atmospheric, modulated or thermograde system of heating will be considered as any system in which the steam pressure ordinarily carried is practically at atmosphere or slightly below or in which the returns are open to the atmosphere and where no pump or other positive mechanical device is employed to pull back the returns.*

XII.—THE KRIEBEL SYSTEM.

In the Kriebel system of vapor-vacuum heating, the vapor-vacuum controller is the basis feature. This device is located above the boiler in the basement and operates to expel the air from the system, at the same time preventing the vapor from escaping through the expansion of the brass tube of the controller.

This system may be explained in a simple manner by referring to the accompanying diagram (Fig. 1) which shows a boiler and one radiator, with the supply and return pipes, and the controller.

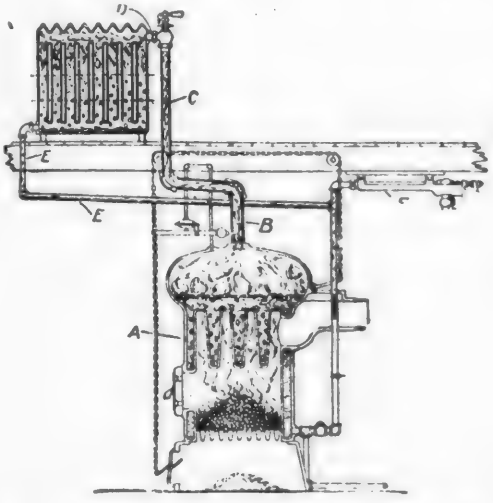


FIG. 1—DIAGRAMMATIC LAYOUT OF KRIEBEL SYSTEM.

Shortly after the fire has been started in the boiler (A) and when the thin bodies of water, enveloped by the products of combustion, begin to absorb heat, the vapor commences to rise from the water and is suspended in the space at the top of the boiler above the water line. It then makes its way into the main supply pipe (B) to which is connected the branch pipe (C) to the radiator.

As the vapor enters the piping, which has until now been filled with air, the air is forced ahead of the vapor, making its way to the radiator. Entering through the inlet valve (D) the vapor dislodges the air from the radiator, forcing it through the return pipe (E) and on through the return main to the controller (F) where it is ejected from the system. In this way the controller performs the function of air valve for the entire system.

FIG. 2—VAPOR-VACUUM CONTROLLER.

As the vapor forces the air from the system it naturally follows the same course to the controller. Here, as already stated, it is prevented from escaping by the action of the heat on the brass expansion tube. This action closes the system.

As the vapor in the system condenses it creates a vacuum, exerting a constant suction on the boiler. This completes the cycle and the system may then be operated without noticeable pressure on the boiler.

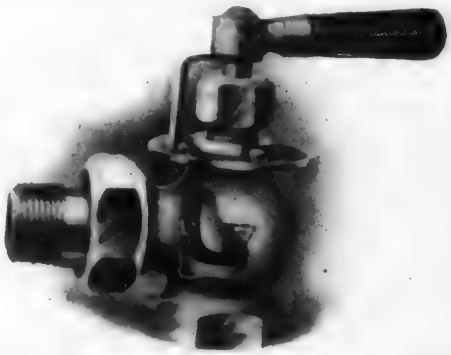


FIG. 3—KRIEBEL RADIATOR INLET VALVE.

Water radiators are used, the inlet valve being at the top of the radiator. In the Kriebel system, this valve is of the rotary cylinder type and may be opened or closed with a single motion of the wrist. The cylinder in the valve has a graduated port through which the vapor passes into the radiator. The valves are made with

different-sized ports, so that by employing a system of numbering, the right size of valve to use with each radiator is indicated.

FIG. 4—RADIATOR RETURN CONNECTION USED WITH KRIEBEL SYSTEM.

Of unique construction also is the radiator return connection or union elbow, with baffler. This connection allows the air and condensation to pass from the radiators freely and at the same time is designed to prevent the possibility of vapor working up through the returns when the supply valves on the radiators are closed.

The ease with which the Kriebel system may be applied to steam heating apparatus already installed is emphasized by the manufacturers as one of its most notable features.

Although not a necessary part of the system, the vapor vacuum stabilizer for controlling the drafts is recommended for use in all installations. This device operates to insure a uniform condition in the fire chamber of the boiler, regardless of the thickness of the fire or the intensity of the draft. It is differentiated from the ordinary thermostat for adjusting the boiler dampers according to the temperatures of the building. The stabilizer, on the other hand, has to do only with the burning of the fuel. The damper on the stabilizer swings on a knife edge, rendering it sensitive to slight changes in air pressure. It is fitted to the boiler smoke pipe, preferably near the smoke hood. A tee is usually inserted in the smoke pipe for this purpose. When in operation it is on the move continually, being affected by every gust of wind acting on the chimney draft. The stabilizer may be adjusted by two weights, so as to maintain a fire corresponding to the weather conditions.

FIG. 5—DRAFT STABILIZER.

The manufacturer of the Kriebel system is the Vapor-Vacuum Heating Co., Philadelphia, Pa.

The Development of the Individual Forced-Blast Heating Unit.

Supplementing the article published in THE HEATING AND VENTILATING MAGAZINE for June on "The Rise of the Unit Heater," the following account, given by F. R. Ellis, engineer of the B. F. Sturtevant Company, of the development of the individual forced-blast heating unit, will be found of more than ordinary interest, even to the old-timers, as showing the steps that led up to the present design:

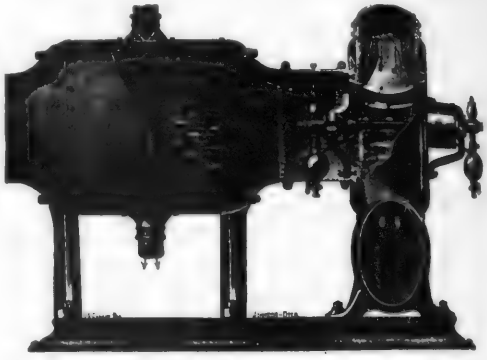


FIG. 1—FIRST TYPE OF UNIT HEATING APPARATUS.

During the last few years the small individual forced-blast heating unit has been so advertised and advocated that the general impression has been given that the unit heater, or blast heater, as it is called, is of recent origin. It may prove interesting to trace the development of one line of unit heating apparatus and for this reason this paper deals with the unit heater that has been brought down from the early designs of B. F. Sturtevant.

In Mr. Sturtevant's catalogue of 1870 is shown what is doubtless the first unit heating apparatus ever designed. This apparatus is illustrated in Fig. 1 which is a reproduction of the wood cut from this early catalogue. It will be seen that the unit consists of a combined fan and heater; the fan being of an early centrifugal design from which was later developed the now commonly-known Sturtevant Monogram type of fan. From the cut it will be noticed that the fan was made with cast-

iron sides and a roundabout made in sections of cast-iron.

This construction was a few years later changed to the present Monogram type of housing. The heater was of a tubular type, so arranged that the air passed through the tubes, while the steam for

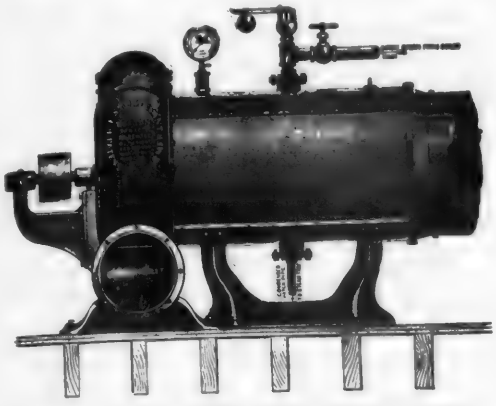


FIG. 2—EARLY TYPE OF TUBULAR UNIT HEATER WITH STEAM GAUGE.

heating the air filled the steel-plate cylinder. One end of the heater was attached directly to the intake of the fan, the other end being open for the admission of the air. This apparatus was arranged and built for either exhaust or live steam. When arranged for the latter, a safety valve was provided to prevent disaster from excessive steam pressure. To indicate the steam pressure an ordinary gauge was used. (See Fig. 2.)

DESIGN SUGGESTED BY THAT OF TUBULAR-TYPE STEAM BOILER.

Undoubtedly this heater had its origin from the plain tubular-type steam boiler then in use and it was logical to apply the same type of apparatus for heating air as was used to convey heat from the gases of combustion to water to produce steam. We know today that Mr. Sturtevant did not find his heater as efficient as a boiler built on similar lines, because the heat transmission from a gas to a medium of the density of water is much greater than the rate of transmissions from steam, a gas, to air, also a gas. Undoubtedly experience soon showed that this arrangement of heating surface was inefficient at velocities which were practical. Tests made a few years ago show that the efficiency of the heating surface of the tubular-type heater is approximately half of that of the same area of surface arranged in the present-day type of coil heater. However, at velocities of 5,000 to 6,000 ft. per minute, the effectiveness of a tubular heater is nearly the same as that of a pipe coil, but at such velocities the resistance of the flow of air is so great that its use is precluded.

While it should be strange, in the light of designs and tests discarded years ago, it not infrequently happens that there will be a new advocate of certain types of apparatus that most engineers know had their origin years ago and were discarded after their inefficiencies were discovered. A case in point is the tubular heater, for only a dozen years ago an advocate of tubular heaters attempted to build them thinking

FIG. 3—FIRST TYPE OF PIPE COIL HEATER.

they could compete with steam coils in efficiency, cost and floor space occupied.

THE CHANGE FROM TUBULAR HEATER TO USE OF PIPE COILS.

Undoubtedly from the limitations of the tubular heater there was developed the pipe-coil heater which consisted of a hollow cast-iron base into which were threaded wrought-iron pipes usually 1 in. in diameter. The pipes stood vertically and were arranged with connections across the top so that there was a circulation of steam up one side and down the other. The whole heater was enclosed in the steel-plate casing which was bolted to a cast-iron air distributing box secured to the base. A partition through the center of the coil extended nearly to the top of the pipes and was placed there to cause the air blowing over the coils to travel in the

desired direction. An apparatus of this type is shown in one of Mr. Sturtevant's catalogues of 1881. (See Fig. 3.) The cast-iron base at the bottom of the heater formed the intake connection and acted as a distributing chamber so that the air entered around practically all of the pipes.

A blower or exhauster was used with this type of heater. The air, entering the heater at the bottom, rose vertically along the pipes travelling across the pipes at the top. It then passed down the other side of the partition along the vertical pipes, on the other side of the heater. This form of heating coil, with the vertical pipes and horizontal cross-connecting pipes, was a fore-runner of the present day coil, which is now made in sectional-base patterns of two or four rows.

FORERUNNER OF SOLID BASE HEATER AND FAN.

The next adaptation of the unit heater type was the fore-runner of the appartus marketed today under the name of solid base heater and fan. Fig. 4 shows one of these units. This figure was reproduced

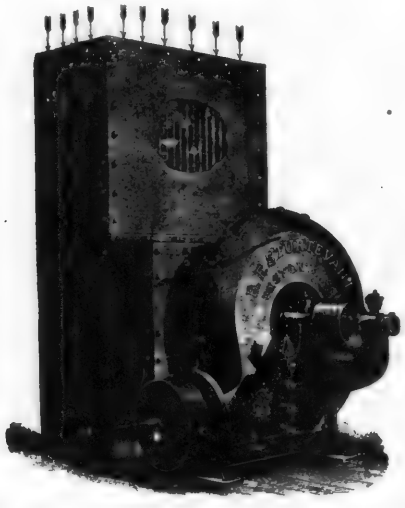


FIG. 4—FORERUNNER OF PRESENT UNIT HEATER DESIGN.

from a catalogue of 1880. The pipes were secured to a cast-iron hollow base which was surmounted with an enclosing steel-plate jacket on the side. The top was uncovered for the admission of air which was drawn over the vertical pipes by the action of an exhaust fan, directly attached to the heater casing.

With but few changes the apparatus designed forty years ago is to-day on the market and finds a ready application for heating small quantities of air for various heating and drying purposes. Some of the outfits made thirty or forty years ago are still in use and giving as good service as when they were first purchased.

With the development of the small steam turbine came a disc fan which could be used directly connected to the turbine and was suitable for comparatively high speeds. These fans when so operating are capable

FIG. 5—LATEST DEVELOPMENT OF STURTEVANT UNIT AIR HEATER.

of moving air against a resistance of several inches water pressure. They occupy but little space and have good volumetric and mechanical efficiency. The combination of one of these fans and small steam turbines with a heating coil makes the present-day Sturtevant unit heater (Fig. 5). It is one of those rare units in which the waste of one part of the apparatus becomes the source of supply for the other part, as in this case the exhaust from the steam turbine becomes the steam supply for the heating coils. As the exhaust can be limited to a few pounds pressure, cast-iron radiation is frequently employed as the radiating surface. Vento radiating surface is especially adaptable for use in these units. The fan is usually placed at the top of the apparatus and arranged to discharge the air down over

the heating surface. The outlet at the bottom is arranged to diffuse the air to the spaces to be heated.

VARIED ADVANTAGES AND APPLICATIONS OF UNIT HEATER.

The advantages and application of this type of apparatus are varied. For a building that requires but one unit the heating apparatus becomes a simple, compact and inexpensive outfit. Wall radiation is eliminated and the expense of carrying steam pipes to various parts of the building is not necessary. The condensation from the coils can be trapped and carried to any desired point and no elaborate return system is necessary. For large buildings where a number of these units are required the advantages become even more varied.

Temporary shops and warehouses can find no better apparatus for heating than these, as they are readily transportable from one location to another. They can be placed on the ordinary floor because the large base reduces the load per square foot within the usual building requirements. Flexible metal hose is sufficent to carry the steam supply to the turbine. Where economy is not of necessity or advantage the exhaust can be allowed to waste away.

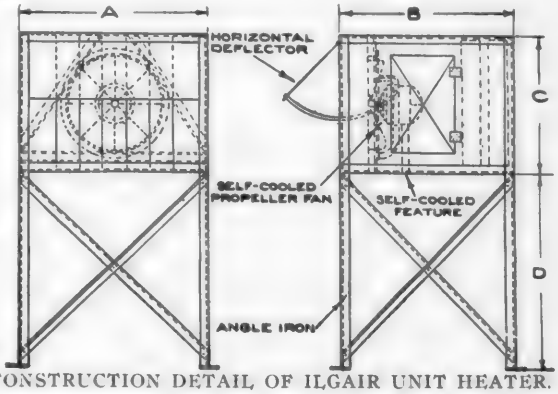
The design of this apparatus works in very properly with the theory of the recirculation of air. By taking the air from the upper part of the room, heating it and discharging it along the floor the minimum heat is lost by outward leakage. For large shops this arrangement permits an intimate mixture of cooled air from the walls and the inward leakage with the heated air, which tends to produce a uniform heating. As the heated air tends to rise it mixes with the cool air from the ceiling and wall, which causes it to drop. With the air discharged along the floor line and the intake placed near the ceiling line, the tendency to overheat the upper part of the rooms and lose excessive heat through the ceiling and roof is eliminated.

The unit heater illustrated in Fig. 5 discharges 7500 cu. ft. per minute. The radiation included has a capacity to heat the air from 60° to 126° F. with steam at 5 lbs. pressure. This is equivalent to adding to the air 495,000 B. T. U. per hour. Knowing these data, the engineer can determine from the heat losses of the building under given conditions of inside and outside temperature how units are required.

The general arrangement in large shops is to place heaters near the four corners to blow along the end walls and to place the other heaters near the walls the long way of the building, and blow toward the center of the building.

Possibly a little better idea of the construction of both the Ilgair unit heater and the ABC unit heater may be gained from the accompanying illustrations which have been received as a contribution to the discussion of "The Rise of the Unit Heater." In each case the arrangement shows the latest designs of these heaters.

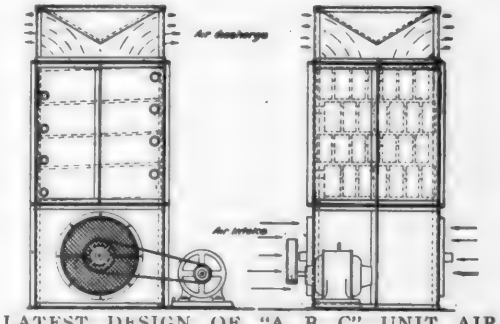
It should be stated that the Ilgair unit heater is now equipped with Vento heaters, replacing the ordinary two-stack heaters formerly used. At the Ford Eagle Works, in Detroit, 60 of these units are installed, being supplied with forced hot water as the heating medium.



CONSTRUCTION DETAIL OF ILGAIR UNIT HEATER.

In connection with the ABC heater, the manufacturers point out that it is not always possible to adhere to the use of this heater, inasmuch as the particular arrangement of the building in some cases requires a larger than standard heater and the arrangements for driving the fan in many cases have to be special.

As a rule, it is stated, the unit heater is cheaper to install than the regular blast heating system in conjunction with ducts.


LATEST DESIGN OF "A B C" UNIT AIR HEATER.

The flexibility of the unit heater arrangement is also greater. In addition to these advantages, there is also the ability of localizing the heating effect in large building, such as structural shops, where heat is only necessary in a few parts of the shop, as around punches, shears, rolls, etc. There is, of course, this limitation, that unit heaters are adapted for heating purposes only and can seldom be depended upon for ventilation.

Unit heaters generally require less power for operation than the blast system of heating, this being particularly the case where the exhaust steam from turbines is used in the coils of the unit heater.

THE RECONSTRUCTION ERA

Economics of the Construction Industry.

An important report on "Economics of the Construction Industry has been prepared by the Division of Public Works and Construction Development, Information and Education Service of the Department of Labor of which Franklin T. Miller is the director. The report gives in detail the reasons why the expected great fall in prices has not occurred and then goes on to say that business men of the United States need not hesitate to plan for an immediate period of business prosperity. No period of depression and no collapse of values need be feared, says the report, and the man who goes full speed ahead will gain an advantage over his procrastinating competitor which will far outweigh any possible slight decline in costs of production.

Proposal for National Construction Program.

The National Federation of Construction Industries is advocating as one of the most important steps to be taken by Congress in the restoration of general business activity, the provision that the national government shall concentrate into the immediate future its program of the construction of public works which would naturally be extended over the next several years. In a summary compiled by the federation of "own your home" campaign cities, it is stated that 64 cities are now carrying on the campaign and 84 other cities are organizing such campaigns.

Replies to a questionnaire sent out by the federation to 1,400 of the leading construction industries and related interests confirm the fact that during the past month general business conditions have greatly improved and that the prospects for the future are bright.

Opportunities for Disabled Soldiers Through Board for Vocational Training.

In connection with the work of re-establishing the disabled soldiers, sailors and marines in civil life, it is stated that the crippled men seen in uniform on the street and engaged in "panhandling" kindly disposed persons, are, in nearly every case, plain fakirs. Colonel Arthur Woods, assistant to the Secretary of War in charge of finding employment for demobilized soldiers, states that no man disabled in the service need engage in any sort of holdup game on the streets nor need he engage in any occupation whatever for which he is not suited.

Those who see men in uniform so engaged are asked to inform them of the provision made for their training and placement by the Government through the Federal Board for Vocational Education. Branch offices of the board are located in Boston, New York, Philadelphia, Washington, Atlanta, New Orleans, Cincinnati, Chicago, St. Louis, Minneapolis, Denver, San Francisco, Seattle and Dallas.

Activities of U. S. Training Service.

"In too many cases the old system of letting shop foremen hire men without much consideration for the applicant's ability or training is still in effect, with the result that many new employees spoil work, ruin expensive machinery and tools, and really produce little work that is perfect enough to be shipped." The foregoing is one of the reasons mentioned by E. A. Barnes, superintendent of the Gen-

eral Electric Company's plant in Fort Wayne, Ind., why industrial training as promoted y the U. S. Training Service of the Department of Labor, should be generally adopted in American industries. His views are given in detail in a pamphlet entitled "A Business Man's Experience with Industrial Training," published by the Training Service. This booklet is one of a series dealing with various phases of industrial training which may be obtained by addressing the Training Service, care of the Department of Labor, in Washington.

Illustrated Lectures on Accident Prevention.

Repeated requests to the Working Conditions Service of the Department of Labor for information on motion pictures and slides for educational work for accident prevention in industry have led to the publication of a pamphlet on "How to Give Illustrated Lectures on Accident Prevention to Workmen." As only one-third of the industrial accidents are due to engineering causes, one of the big problems is to teach workers to recognize the hazards of their trade and how to guard against them. The Working Conditions Service makes this contribution to industries in order to assist in developing their educational safety program.

To Encourage Building of Homes.

To hasten a revival of business operations and thereby relieve the housing situation the Merchants' Association of New York is urging that a law be speedily enacted exempting from all Federal taxes, including surtaxes and excess profit taxes, the interest from investments not exceeding $40,000 in mortgages on real estate in the United States owned by any taxpayer.

Government Again in Urgent Need of Stenographers, Typists and Bookkeepers.

Under date of June 14, 1919, the United States Civil Service Commission sent out an urgent call for stenographers, typists and bookkeepers, both men and women. The Bureau of War Risk Insurance is one of the principal sufferers from the shortage. The usual entrance salaries are: Stenographers $1200, typists $1100, bookkeepers $1100 and $1200 a year, aside from any temporary bonuses allowed. Higher-salaried positions are usually filled through promotion.

The government, it is added, constantly maintains a list of available rooms in private houses in Washington, and conducts attractive halls to accommodate a limited number. Living conditions, it is stated, are considerably improved.

Full information and application blanks may be obtained from the Secretary of the Local Board of Civil Service Examiners at the post-office or custom house in any city.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Professor Dibble Made a Member of the Committee on Research.

Announcement is made that Professor S. E. Dibble, head of the department of heating, ventilating and plumbing at the Carnegie Institute of Technology, Pittsburgh, Pa., has been appointed a member of the Committee on Research of the heating engineers' society, filling the place left vacant by the death of the late William F. McDonald, of Detroit. Professor Dibble will be able to come into close touch with the work of the Research Bureau in the Bureau of Mines Building, as his offices are but a few steps from the bureau.

Annual Meeting of National Warm Air Heating and Ventilating Association.

Prospects of a greater opportunity for warm-air furnace heating than ever before were voiced by President W. G. Wise in opening the annual meeting of the National Warm Air Heating and Ventilating Association, which was held at the Hotel Deshler, Columbus, O., June 11. The warm-air research work now under way at the University of Illinois in Urbana was referred to by President Wise as being full of promise in remedying the present faults of furnace heating and he urged the co-operation of the manufacturers in perfecting the design, construction and installation of this type of heating apparatus.

Secretary Allen W. Williams stated that out of 99 manufacturers making reports on their output of heaters during 1918, 31 reported an increase averaging 15%, while 70 manufacturers reported a decrease aver-

aging 23%; eight manufacturers reported no change. He estimated that the decrease in the numbers of heaters manufactured came to about 35,000. That the situation was not more serious, he said, was due to the Government's use of room heaters and the increasing popularity of the pipeless furnace.

The association's trade-mark, he reported, is coming into wider use, especially in advertising copy.

In the matter of business prospects for the coming year, Secretary Allen quoted from the figures given out by the Department of Labor regarding the shortage of buildings and instanced the conditions in Columbus as an example, stating that not over 200 buildings had been constructed in that city during 1918, although the normal yearly average is 2,000.

A point brought out by E. Norris, speaking for the association's War Service Committee, was that standardization on the part of furnace manufacturers was one of the most important lessons taught by the war.

Other speakers were Director John R. Allen, of the heating engineers' society Bureau of Research, who endorsed the movement for standardization of furnaces; A. T. Fleming, Ohio State fire marshal, who spoke on "Avoiding Installation Hazards," with special reference to the fire hazard; W. E. Pratt, who presented a paper on "A Comparison of Warm-Air Heating and Hot-Water Heating;" Professor A. C. Willard, of the Engineering Experiment Station, University of Illinois, where the furnace tests are being conducted; and P. J. Daugherty, who discussed the difficulties attending furnace testing.

The officers were re-elected as follows: President, W. G. Wise; vice-president, J. A. Howard; treasurer, I. L. Jones; secretary, Allen W. Williams.

Following the meeting a dinner was held at the Hotel Deshler, where the speakers included Edwin A. Scott, editor of *Sheet Metal*, and Thomas W. Pearson, of the Lamneck Company.

On the same evening a special bulletin was issued at a dinner given by the "Old Guard" of the association. The bulletin is here reproduced as a side-light on the activities of the "outside convention."

American Society of Mechanical Engineers.

Among the papers presented at the spring meeting of the American Society of Mechanical Engineers, in Detroit, June 16-19, was one on "Central Station Heating in Detroit," by J. H. Walker. At the fuel session papers were presented on "Pulverized Coal as a Fuel," by N. C. Harrison, and on "Pulverized Coal for Stationary Boilers," by H. G. Barnhurst and Frederick A. Scheffler.

New Publications.

FLUID HEAT TRANSMISSION BY THE MERRILL PROCESS is the title of a carefully-prepared treatise devoted to the Merrill process of industrial heating. It is published by the Parks-Cramer Co., Fitchburg, Mass., which is the general agent for the system. The system is designed for the transmission and delivery of heat at high temperatures, as high as 600° F. For this purpose oil is used as the heating medium. Typical installations are shown of the Merrill system, one being an absorber room of 800,000 B. T. U. per hour capacity, in connection with which are two large kettles, part of a battery of six, heated from the same absorber. The kettles are 5 ft. in diameter and 5½ ft. deep. The circulating fluid in the Merrill system is a specially-refined mineral oil, free from carbon and without vapor pressure or distillate up to its flash point, which is 600° F. It is known as "Meprolene." The pump used for circulating the heated oil is of the positive displacement rotary type. The expansion tank is made of welded steel. Ample safety devices, it is stated, are installed to protect all parts of the system from unintelligent operation. In the appendix, a number of pages are devoted to selections from the company's accumulated data for the benefit of engineers interested in such studies. Size 5 x 8 in. Cloth, pp. 60.

New Type of Low-Pressure Draft Gauge.

A draft gauge in the form of a U-tube, which may be used to measure small differences in pressure in 1-100 of an inch, by the difference in level of two connecting columns of water, has been brought out by the Commonwealth Brass Corporation, Detroit, Mich., and is now offered to the trade. The gauge consists of two glass tubes of large area, mounted on a brass frame and communicating by a hole in the base.

To eliminate the inaccuracy of ordinary U-tube readings, due to capillarity, a micrometer dial screw, having a point at the center of the tube, is raised and lowered with its dial against a scale. The

image of this point can be seen in the water and when the point of the screw and its image meet, the exact level of the water in the tube has been reached.

The instrument is made of cast brass, nickle-plated and polished, and has heavy glass tubes. The whole instrument is of such size as to be conveniently carried in the pocket.

Trade Literature.

"F AND K" CAST-IRON HOT BLAST RADIATOR, a comparatively new design of this type of heater, is brought to the attention of the trade in a circular published by the "F and K" products Co., Cleveland, O., giving details of its construction and operation. It is made in single sections and is assembled by means of slip nipples. Emphasis is laid by the manufacturers on several principles embodied in this heater, such as the divided steam chamber, the provision for perfect impingement of air, the ease in assembling and the efficiency. The internal construction of each section is divided into three parts, a center chamber and two outer chambers. The center chamber receives the steam which is conveyed to the top of each section for distribution to the two outer chambers without coming into contact with the steam, water or air of the outer chambers. By this method of construction, a minus pressure is obtained in the outer chambers, which causes a partial vacuum to be formed, thereby causing the air and steam to be drawn completely through the entire section and to be expelled through the return chamber. This also prevents air binding. The desired air impingement is secured by the manner in which the extended cored heating surface is set on an angle running horizontally and spaced equally in form so as to split the incoming air. The friction is divided by the projections being so formed that three rows are splitters and the two inner rows are circles designed to wrap the air. The resistance can be increased or decreased by varying the length of the slip nipple, giving any free area desired.

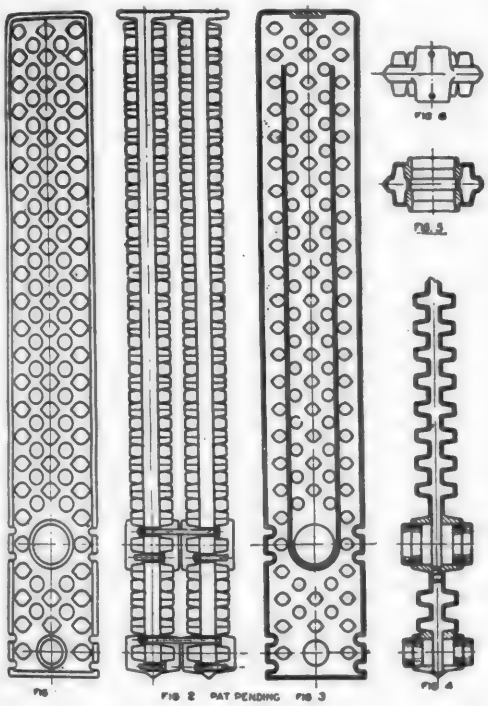


FIGURE 1.—EXTERIOR VERTICAL SECTION.
FIGURE 2.—EXTERIOR TWO ASSEMBLED SECTIONS
FIGURE 3.—INTERIOR VERTICAL SECTION
FIGURE 4.—INTERIOR VERTICAL CROSS SECTION
FIGURE 5.—HORIZONTAL CROSS SECTION
FIGURE 6.—EXTERIOR TOP HORIZONTAL SECTION

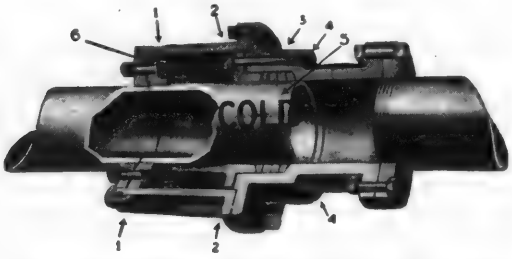
CONSTRUCTION OF "F AND K" INDIRECT HEATER.

SOME FACTS ABOUT GALVANIZED AND OTHER COATED PIPE are contained in a new bulletin (No. 41) issued by the A. M. Byers Co., Pittsburgh, Pa., and advocating generally the galvanizing of pipe, especially for hot water lines and for other service where conditions are very severe. Galvanizing, states the bulletin, probably adds from 20% to 30% to the life of black iron and steel pipe. Micro-photographs are shown of sections of iron and steel pipe illustrating the differenece in the effects of galvanizing on the two types. In the case of galvanized iron pipe the galvanizing, it is shown, when the pipe is flattened out, sticks like glue and does not flake off. In the case of steel pipe, the galvanizing crumbles and comes off in large scales and flakes. This, incidentally, is suggested as a test for determining whether a pipe is made of iron or steel. Other micro-photographs are presented to indicate why protective coatings on iron obtain a deep anchorage on the pipe. A description is given of the hot metal galvanizing process used on Byers pipe, supplemented by tests showing the relative coating on Byers pipe and on the best steel pipe. These test results are noticeably in favor of Byers' pipe. Size 8½ x 11¼ in. Pp. 8.

THE WORD AND THE MARK, which is the title of a new circular issued by the Nash Engineering Co., South Norwalk, Conn., announces the adoption of the word "Hytor," for the Nash hydroturbine and other Nash products. The operation of the Nash Hytor, which is an air compressor and vacuum pump of unique design, is

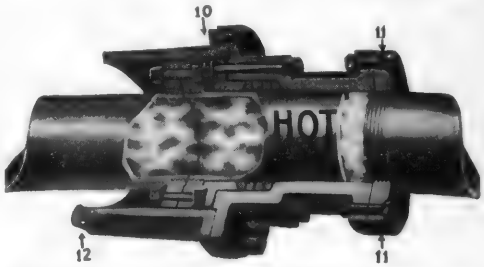
explained at length in the circular. The rotor in hydraulic balance revolves freely, with large clearance, in an elliptical casing containing a quantity of water. The water turning with the rotor and constrained to follow the casing by centrifugal force, alternately recedes from and is forced back into the rotor. As the water recedes it draws in air through the inlet ports. When the water is forced back into the rotor by the converging casing, the air is discharged through the outlet ports. The two inlet ports are connected with the inlet of the pump and the two outlets with the outlet. If the inlet is restricted a vacuum is created, while if the outlet is restricted a pressure is obtained. The water stays at the level of the outlet ports and a small amount is constantly supplied to take up the heat of compression, the surplus being discharged with the air. The entrained moisture is removed by a separator. As several blades act simultaneously, the Hytor, it is pointed out, delivers air without pulsation.

HOWARD EXPANSION JOINTS, described as the sure-tight, trouble-free joints, and made in the guided and semi-guided types, single or double, with or without anchor base and service outlets, are featured in a new catalogue received from the Howard Iron Works, Buffalo, N. Y The guided types are made for 4, 8, 12 and 16 in. of traverse.



HOWARD GUIDED EXPANSION JOINT WHEN COLD, SHOWING MAXIMUM OF TRAVERSE.

In the semi-guided types the traverse varies according to the size of the joint. These expansion joints are made of semi-steel castings in the company's own foundry and are described as accurately machined, assembled, tested and carefully inspected before being shipped. The types shown include the Howard guided expansion joint, Type A; Type B, with extension flange; Type C, with Van Stone flange; Type D, with anchor base; Type E, with anchor chamber and service branch outlets; Type G, semi-guided, with screwed ends; Type H, semi-guided, with flanged ends; Type I, semi-guided, double expansion, with flanged ends and with anchor base and service branch outlets. Each type is accompanied by dimension tables. In addition a typical drawing is shown of several of the types of the guided expansion joints in place. A section of the catalogue is devoted to an explanation of the



HOWARD GUIDED EXPANSION JOINT WITH STEAM PIPE HOT.

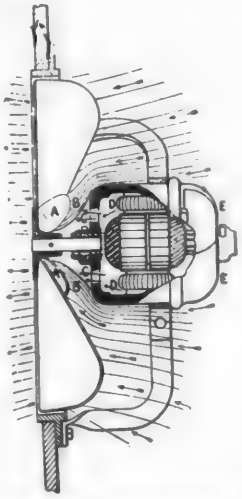
operation of the guided expansion joint, accompanied by detail illustrations, showing how the maximum of traverse is obtained in the Howard type, how strains or distortions are eliminated and how tight joints, without attention are assured through the fact that the inner slip joint is made of Howard bronze which cannot rust against the packing. Size 6 x 9 in. Pp. 24.

HARTMANN RADIATOR BRACKETS, manufactured by Charles Hartmann Co., 985 Dean St., Brooklyn, N. Y., are featured in circulars descriptive of these devices. The brackets are fastened directly to the wall with expansion bolts or lag screws, so that no wood strips are needed. The bolt holes are oval, making the brackets adjustable so as to give the radiator the right pitch. The brackets are made of pressed steel, and are adapted for use with wall radiators, or for one to five-column direct radiators. They are made in a number of sizes.

BUFFALO FANS, BLOWERS AND EXHAUSTERS, including exhausters for gases and acid fumes, Buffalo standard reversible steel-plate mill exhausters, Buffalo dust and refuse collectors, baby Conoidal fans, electric and pulley disk and propeller fans, are presented in a convenient form in Section No. 400, issued by the Buffalo Forge Co., Buffalo, N. Y. Full data are given regarding each type and the catalogue includes some useful suggestions to follow in ordering. Size 5 x 7½ in. Pp. 403 to 436.

Albany, N. Y.—The machinery to start the State's building programme, by which it is expected to relieve the unemployed situation, was put in motion when the State Hospital Commission opened bids for the construction of the new Central Islip State Hospital building. W. B. Armstrong & Co., Albany, were the lowest bidders for the heating plant, at $22,842.

MODERN VENTILATING APPARATUS, sixth edition, has been published by the Batterman-Truitt Co., Chicago, Ill. and is devoted to the company's line, including Autovent propeller fans, motor-driven electric propeller fans both for direct and alternating curret; also the Uniblade line of blowers, both motor-driven and pulley-driven. The Autovent louvres for preventing back drafts in fan openings when the fan is not running, are also featured in the bulletin. An important addition to the company's line are fan guards for use



OPERATING PRINCIPLES OF AUTOVENT PROPELLER FANS.

especially on fans within ordinary reaching distance. Under "Heating and Ventilation Data" some useful information is given regarding blast heating, with special reference to theatre and church ventilation, and the heating and ventilation of lodge halls. Size 3½ x 6 in. Pp. 32.

PENBERTHY HYDRAULIC VACUUM GENERATOR, for use with steam heating systems, is a remarkable device which has been brought out by the Penberthy Injector Co., Detroit, Mich., and is the subject of recently-issued circular matter. It is intended to be attached to the return pipe of the heating system and is operated by water from a faucet. It is stated that in five minutes it will draw the cold air from the radiators and pipes, allowing the steam to circulate freely to the most remote radiator. The vacuum generator is attached at the highest point of the return line in the basement. The city water pipe is then connected to the generator, the water passing to the sewer after serving its purpose in the generator. The vacuum

PENBERTHY HYDRAULIC VACUUM GENERATOR FOR STEAM HEATING SYSTEMS.

generator itself contains a double-check float valve which holds the vacuum in the system when once established and also prevents the water of condensation from siphoning out through the generator into the sewer. Therefore, any other check valve is superfluous. The generator is hand-operated, a chain being attached to it and extending to the upper floor. The chain is attached to a lever which opens the water valve. The action of the water passing through pulls the air from the system. As the steam passes through the radiators, it is stated, the instantaneous change in temperature causes the valves on the outlet ends of the radiators to close automatically, thus holding steam in the radiator. When the proper vacuum is attained, it exerts a tension on the diaphragm of the generator, shutting off the water.

BUILDING FOR VICTORY, by Col. W. A. Starrett, U. S. A., head of the Emergency Construction Section of the War Industries Board, has been reprinted from *Scribner's Magazine* for November, 1918, by the Thompson-Starrett Co., New York. During the period of the government's great building programme, Colonel Starrett had unusual opportunities for observing the work as it proceeded and his story is well worth reading on the part of those interested in building construction on a scale never before achieved. A great deal of the work described was carried out by the Thompson-Starrett Co., of New York, and the reprint supplements the previously-mentioned booklet on "Building and Industrial Construction," published by this company. Size 8¼ x 11½ in. Pp. 32.

Towards a National Building Guild.

The trend of events in the building industry in England is being watched with interest in this country because England, due to its prior entry into the war, has felt more keenly the effect of the changed economic and labor conditions which are coming up for solution both here and abroad.

Arthur J. Penty, writing in the Journal of the American Institute of Architects, states that no industry has undergone a greater transformation since 1914 than the building trade, After an almost total collapse following the outbreak of the war, when private building come to an end, the building trade got a new lease of life in the building of munition town and factories. Mr. Penty makes the comment that in working thus under the direction of the Office of Works and other Government departments, a new condition has been created which may result in the building trade becoming entirely an adjunct of bureaucracy. The concentration of the direction of building operations in the hands of official departments he considers an evil of the first magnitude. Besides the fact that official conditions are the worst conceivable for the production of design of any kind, Mr. Penty holds that all concerned, including the architect, the engineer and the workman, would practically be reduced to servile positons. Incidentally he calls attention to the fact that as a rule the heads of the departments run by the government are engineers who, he claims, should not be allowed to usurp the architectural function.

Mr. Penty urges the workers, with whom he classes the engineers and architects, to organize themselves into a National Building Guild so as to acquire a definite status and insure that their labor will no longer be treated as a commodity; for they would be able to demand and to exercise competently where obtained, the full control of their industry. Such a guild is defined as an organization possessing an effective monopoly of labor in an industry to which the State delegates the complete control (of that industry) in its function of supplying the community with its goods or services. Its keynote would be responsibility, which with the abolition of the profiteering basis of industry, becomes for the first time a genuine possibility for the workers. Such a guild would be completely responsible for the erection and maintenance in repair of all buildings whether required by individuals, other guilds, or public bodies. It would regulate apprentices, provide such technical education as was required, and execute work on a basis of schedule rates fixed by arrangements with representatives of the State or local authorities. It would guarantee the quality of the work while undertaking, and perhaps extending, such responsibilities of a mutual aid character as are now undertaken by a trade union.

Mr. Penty believes that the initiative for the organization of a National Building Guild should originate with the workers. As a preliminary the unions should set to work without delay to put their own house in order and to bring about reforms in trade union organization necessary to prepare them to function in guilds. The principle of organization should probably be for building craft organizations to be organized into local federations or industrial unions, while the national organization should consist of a federation of these local federations.

When this preliminary work has been

SALES ENGINEERING FORCE OF WARREN.

accomplished the workers should associate with themselves such architects as have worked for a revival of architecture on a basis of craftsmanship and who are in sympathy with the guild ideal as distinct from those whose attitude has been purely professional. A National Building Guild, based on the lines outlined, in Mr. Penty's judgment, would enable the building trades to recover the traditional skill of the mediaeval craftsman. In the course of a generation, he believes, the need of the architect, as he exists to-day would disappear. His function would be merged with that of the more highly skilled workers.

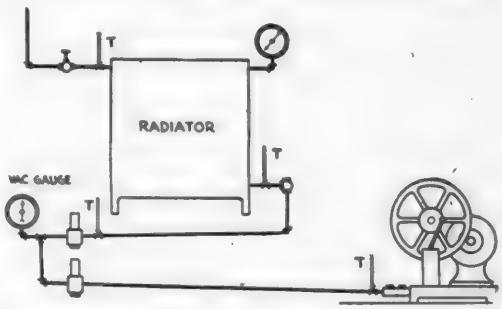
Sales Engineering Convention of Warren Webster & Company.

A successful convention of the managers and sales engineers of Warren Webster & Co., Camden, N. J., was held at Atlantic City recently, the accompanying photograph showing the convention party. The sessions continued five days and were taken up with discussions on business administration, manufactured products, engineering, and sales.

New Arrangement of Donnelly Positive Differential Heating System.

Tests of a new type of "thermo-differential" valve were described before a recent meeting of the Brooklyn Engineers' Club by James A. Donnelly. This valve is designed especially for use in connection with the Positive Differential System of steam heating. An experimental apparatus was on exhibition at the club so that Mr. Donnelly's hearers had the opportunity of seeing the application and operation of this new valve.

The experimental apparatus, which is here reproduced, consisted of a 50-ft. radiator of the water type, supplied with steam through a fractional valve. A thermometer was placed in the inlet pipe, a steam gauge on the radiator, and another thermometer in the outlet. A vacuum pump was attached to the end of the return, as shown. The return was connected through an impulse check valve and a 1-in. pipe, about 3 ft. long to a "thermo-differential" valve. An additional section of 3 ft. of 1-in. pipe connected the appara-



EXPERIMENTAL APPARATUS TO SHOW ACTION OF "THERMO-DIFFERENTIAL" VALVE.

tus to the pump. A vacuum gauge and a thermometer were placed in the latter pipe, as well as a weighted differential valve. This valve was used for controlling the vacuum by admitting air to the pump suction.

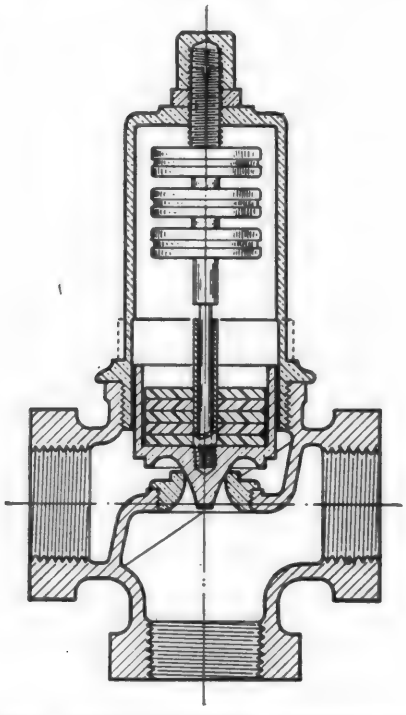
With 1 lb. pressure on the radiator, the inlet and outlet thermometers registered 215° F., the temperature at the inlet of the "thermo-differential" valve was 198°, and at the vacuum pump, 134°. The vacuum-controlling valve was usually adjusted at 8 in. to 10 in. of vacuum. When it was closed, a vacuum of 16 in. was continuously maintained.

WEBSTER & COMPANY AT ATLANTIC CITY.

Several tests were made without the vacuum pump, to show the operation as an ordinary gravity air-return system. By varying the adjustment of the "thermo-differential" valve, which resulted in retaining the water to a greater or less extent, the water was delivered at temperatures of from 180° to 210°.

It was explained that the first valve in the return line (an impulse check valve) was to reduce the passage of steam to a to pass. The function of the "thermo-minimum, while allowing the condensation differential" valve was to arrest any steam that might have passed the impulse valve, holding back the condensation until it cooled, at the same time maintaining a higher pressure and temperature in the radiator than had previously been obtained. The air intake valve, served to cool the condensation still further.

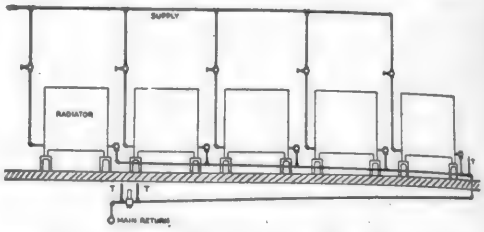
In regular service, the "thermo-differential" valves are placed only in the re-



CONSTRUCTION OF "THERMO-DIFFERENTIAL" VALVE.

turn risers or in the branch returns and are designed to accomplish the purpose of a thermostatic-control valve on each radiator. They contain a thermostatic element and have, in addition, a differential feature in the form of weights so as to maintain various pressure differences ranging from 3 to 5 lbs. between the vacuum pump and the radiator, in case the thermostatic element fails to operate.

Supplementing his descriptions of his experimental apparatus, Mr. Donnelly has since made some field observations at the Naval Gun Plant of the American Radia-



DETAIL OF RADIATION AND RETURN PIPING AT NAVAL GUN PLANT OF AMERICAN RADIATOR COMPANY.

tor Co., at Bayonne, N. J. These buildings had been heated by an ordinary two-pipe gravity-return system, supplied with steam from a battery of ten cast-iron boilers. The addition of a power plant by the Navy Department called for a change to a vacuum return-line system. After changing the piping system and installing impulse and "thermo-differential" valves, an opportunity was afforded to observe the action of the apparatus as an air-return gravity system. A receiving tank and electrically-operated boiler-feed pump had been installed for temporary use, and the dry returns were drilled where they dropped near the boilers, thus providing an open vent for the discharge of the air.

A pressure of 2 to 5 lbs. was carried at the boilers, the weights were removed from the "thermo-differential" valves, and the thermostats adjusted to prevent the passage of steam. After the air valves were removed from the radiators, the circulation was complete throughout the plant, the return water reaching the receiving tank at a temperature of about 140°.

The drop in pressure of the steam main was tested by mercury and water columns. One of the mains, 8 in. to 3 in. in a run of 700 ft., with a total of twenty elbows, and supply 13,000 sq. ft. of 45-in. cast-iron radiation, had a drop in pressure of approximately 2 ozs., per 100 ft. As the steam mains were located in heater rooms, they were not covered, but the returns in the basement were covered with 85% magnesia.

CORTO

The Radiator Classic

Designed by Louis Courtot, Paris

This new French design occupies thirty percent less space. It has larger heat radiating power for its size, responds quicker, and weighs twenty-five percent less. Use the CORTO for your work in which quality, high efficiency, and artistic appearance are desired.

Attractive Corto booklet upon request

AMERICAN RADIATOR COMPANY

Sales branches and showrooms in all the large cities

CAPACITY OF STEAM MAINS IN SQUARE FEET OF EQUIVALENT DIRECT RADIATION.

For a Total Pressure Drop of ⅛ Lb.

Size of Pipe, In. Diam.	Length of Run. Feet: 100	200	300	400	500	750	1000	1250	1500	Size of Pipe In. Diam.
	Square Feet of Equivalent Direct Radiation									
¾	28	20	16	—	—	—	—	—	—	¾
1	63	46	36	32	28	22	20	18	—	1
1¼	116	83	68	59	50	43	37	33	30	1¼
1½	194	137	108	94	86	71	61	55	51	1½
2	427	316	264	228	207	175	147	130	123	2
2½	745	510	425	360	338	282	240	210	193	2½
3	1350	950	710	660	587	482	440	420	350	3
3½	1930	1370	1110	955	880	702	632	560	510	3½
4	2700	1900	1560	1340	1210	985	880	775	720	4
4½	3620	2550	2080	1790	1620	1315	1160	1050	965	4½
5	4800	3410	2790	2400	2170	1755	1560	1405	1280	5
6	7725	5460	4500	3850	3400	2825	2530	2250	2040	6
7	11250	8100	6550	5600	5000	4075	3580	3300	2930	7
8	15800	11250	9150	7875	7020	5700	4775	4425	4220	8
9	21100	15450	11950	10550	9500	7250	6600	5900	5475	9
10	28100	20400	16350	14050	12650	10250	8950	8100	7375	10
12	45600	31600	25750	22300	20000	16150	13900	12700	11800	12
14	59750	42200	33300	28800	25600	20700	18100	16500	15000	14
15	70210	49400	40000	34100	30500	24900	21400	19400	17900	15
16	83750	59750	49250	42500	37900	29900	26600	24000	21800	16
18	113500	93500	65250	56250	50500	41400	35800	32000	29500	18
20	140000	100000	81000	70200	63250	51250	44250	40500	36500	20

DIAMETER OF DRIP PIPES FOR STEAM MAINS.

Size of In. Diam. Steam Main	Length of Steam Main Drained in Feet. 0-100	100-200	200-400	400-600
	Diameter of Drip Pipe—Inches.			
2 or less	½	½	½	¾
2½ and 3	½	¾	¾	1
3½ and 4	¾	¾	1	1¼
4½ and 5	¾	1	1¼	1½
6	1	1¼	1½	1½

(Harrison Safety Boiler Works.)

Note.—We would recommend that no drip pipe be made less than 1 in. and certainly not less than ¾ in., reducing down to the trap size (if a trap is used) at the trap and enlarging immediately after leaving the trap discharge.

ONE-PIPE STEAM SYSTEMS.

Pipe Sizing.

The sizing of pipe of one-pipe mains may be based on an arbitrary rule such as $D = 1/9 \sqrt{R}$ when

D is diameter of main in inches

R is the amount of radiation supplied

Or the tables given in Data Sheets 128-A, B, C, etc., may be used. Supposing a one-pipe system has a distance of 30-in. between the low end of the steam main and the normal boiler water-line. Then the permissible total drop in pressure is about one pound. If half of this loss occurs in the fittings and half in the pipe the pressure drop in the straight pipe must not exceed 1 lb. ÷ 2 or ½ lb. for the run which (if it is 200 ft. from the boiler to the end of the main) would require the use of the "Table for ½ lb. drop — 200 ft. run" (shown in Data Sheet No. 128-C).

Having determined the size of the steam main, the return main may be sized on the basis of Table I or on the capacities given for return lines of all systems as shown on Standard Data Sheet No. 128-F.

TABLE I.

Size of Steam Pipe, Diam. Inches	Dry Return Diam. Inches	Wet Return, Diam. Inches
1	1	¾
1¼	1	1
1½	1¼	1
2	1½	1¼
2½	2	1½
3	2½	2
4	3	2½
5	3	2½
6	4	3
8	4	3
10	5	4
12	6	5

Of course in using any table for sizing pipes the radiation should all be reduced to E. D. R., as explained in full in Standard Data Sheet No. 13, before obtaining sizes from the tables.

For cases where the condensation flows against the steam the table for ⅛ lb. drop (Standard Data Sheet No. 128-A) should be used and the pipe increased *one* pipe size. Dry returns on small lines are usually made one size less than the steam line supplying the same radiation, and large dry returns, two or three pipe sizes less (see Table I herewith).

ONE-PIPE STEAM SYSTEMS.

Riser Sizes.

For risers with steam flowing against the return from the radiators, as occurs in the "circuit" system and "relief" system, a velocity in the main of 10 ft. per second should not be exceeded. On this basis Table I should be used for up-feed risers.

TABLE I.

(Velocity of steam 10 ft. per second.)

Size of Pipe Diam. Inches	Sq. Ft. of Radiation (E. D. R.)
1	30
1¼	60
1½	80
2	130
2½	190
3	290
4	520

With down-feed, such as occurs with the Mills system, an increased velocity of 50% or more is allowable, as shown in Table II.

TABLE II.

Down-Feed Drops.

(Velocity of Steam 15 ft. per second.)

Size of Pipe, Diam. Inches.	Sq. Ft. of Radiation, (E. D. R.).
1	50
1¼	90
1½	120
2	200
2½	290
3	340
4	800

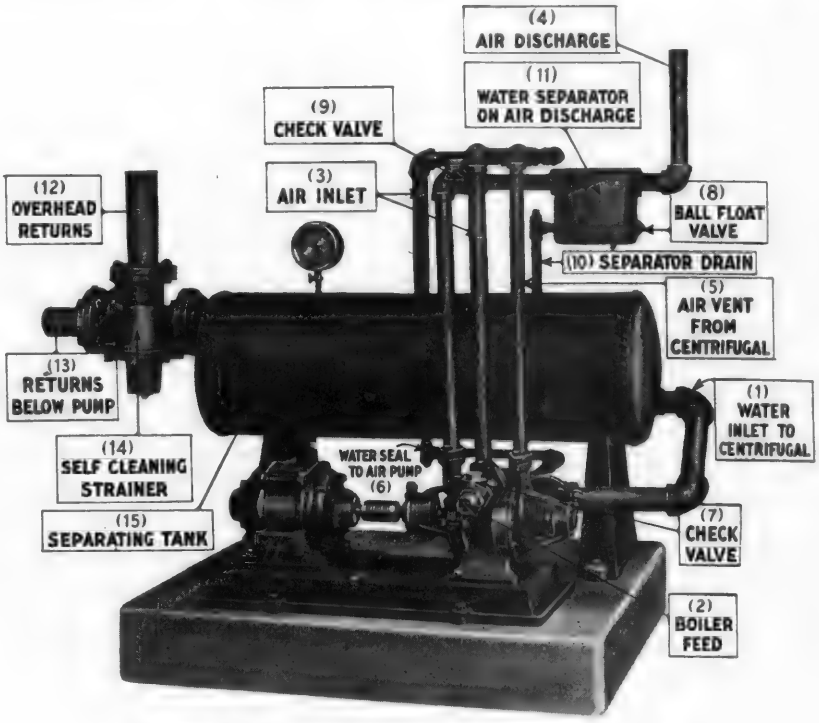
Another authority sizes steam risers on a one-pipe system as shown in Table III.

TABLE III.

Nominal Size of Pipe Diam. Inches.	Up-Feed Riser. 5 stories.	Up-Feed Riser. Over 5 stories.	Down-Feed Riser. 5 stories.	Down-Feed Riser. Over 5 stories.
	Square Feet of Radiation.			
1	34	30	60	54
1¼	67	60	112	100
1½	100	90	162	146
2	200	180	260	234
2½	367	330	600	540
3	667	600	880	790
4	1333	1200	1600	1440

Heating Efficiency

Increase It With the Jennings



Size C for 26,000 square feet radiation, requiring only 2 H. P. Motor at 1,720 R. P. M., when delivering from a vacuum 10 inches mercury against a boiler pressure of 10 lbs.

The Jennings Pump consists of two independent turbine units, an air pump and a water pump, combined in one casing, with the impeller of each mounted on the same shaft.

One unit continuously exhausts air and vapors from the heating system, and the other removes the condensation as it assimilates and forces it directly into the boiler, or up to the hot-well.

The boiler pressure is against the water only. The air and vayor, representing approximately four-fifths of the volume handled, are delivered to the atmosphere *without back pressure. The saving in horse power amounts to over* 50 *per cent.*

The Pump is bronze fitted throughout. The shaft is tobin bronze. The air rotor, water impeller, lobe, port plate, sealing rings and clamping nuts are bronze. The shaft is supported on high grade annular ball bearings mounted outside of the pump casing.

Write for Bulletin No. 8

NASH ENGINEERING CO.

SO. NORWALK, CONN., U. S. A.

TRADE AND MISCELLANEOUS NOTES

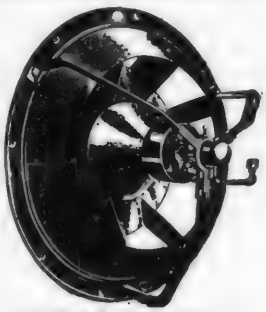
Miscellaneous Notes.

San Francisco, Cal.—As a result of an inspection of heating plants in hotels, apartment houses and laundries, made by John P. Horgan, building inspector, T. A. Reardon, president of the Board of Works, and Fire Marshal Sullivan, an ordinance is being drafted to provide for greater safeguards against fire hazards in these places. The heating plants are oil burners and the inspection showed that many were poorly installed. Oil was found dripping on the floor and the pipe connections were loosely made in places.

Springfield, Ill.—An extensive State building programme is to be started soon by the State Public Welfare Department. An appropriation of $6,299,547, the largest ever set aside for a State building programme, is to be utilized for repair work, permanent improvements and the purchase of land worth $4,000,000, available for public buildings. Most of the new structures will be erected at the State's penal and charitable institutions which care for 27,000 inmates and employ 4,000 persons, who are crowded in their present quarters. One of the most important projects is increased quarters for the School for Feeble-Minded and the erection of a new State penitentiary at Lockport, the estimated cost of the latter being $1,285,000. A hospital building is to be built at the Elgin State Hospital for the Insane, to cost $150,000.

Rock Island, Ill.—On motion of Alderman O. F. Anderson the city council voted to draft an ordinance regulating the ventilation of theatres and auditoriums in Moline.

Cooperstown, N. Y.—While new boilers for the Oneonta State Normal School heating plant were being unloaded from flat cars, the sound of something rattling in the first of the boilers disclosed the fact that



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Belt Driven

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Ventilating Engineers and Contractors
MANUFACTURERS OF
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which are installed by us complete with **Motors, Duct Work** and **Wiring.**

Aligning, Rigging and **Hoisting** done, with labor thoroughly qualified from long experience.

We make a specialty of **Kitchen Exhaust** work. Prominent buildings, hospitals, theatres, and private residences are among our many and recent installations.

The **Duplex Cone** Fans are semi-conoidal fans, made especially to operate against pressure in duct systems.

The **Blackman** Fans are used for fresh air delivery and in duct systems, when no great pressure is involved.

You can have the advantage of our experience.

SEND FOR CATALOGUE

BLACKMAN FAN
Direct Connected to Motor

a loaded hand grenade had been placed in the boiler, of the sort used by the army in France. An investigation is being made by the Delaware & Hudson detective force.

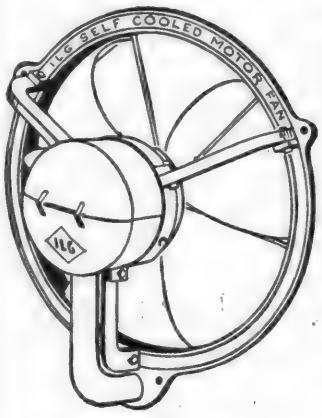
Van H. Manning, director of the Bureau of Mines, Department of the Interior, was given the honorary degree of Doctor of Engineering at the commencement of the University of Pittsburgh, in special recognition of his activities in connection with the war.

Central Supply Association held its eightieth regular meeting in Chicago, June 11. Both in the reports of President Steneck and in that of the secretary, the fact was emphasized that we are on a new level of prices, and that under present conditions pre-war quotations are a thing of the past. Chicago was chosen as the place for the annual meeting of the association, which will be held October 15.

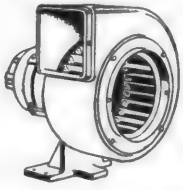
Columbus, O.—Association of Heating and Piping Contractors has been organized in Ohio, the officers being: President, John J. Vogelpohl, Cincinnati; vice-president, W. H. Conklin, Columbus; secretary, John K. Peck, Cincinnati; assistant secre-

VENTILATION vs. PROFITS

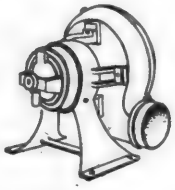
Warm weather brings with it many indoor air conditions which impede workmanship and reduce profits



"Self Cooled" Propeller Fan
Note Section View



Type "V" Volume Blower



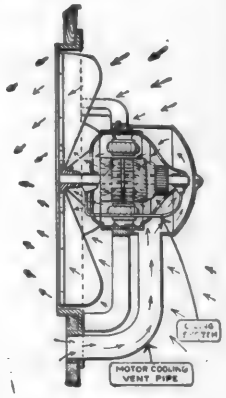
Type "P" Volume Blower

Various Industries, Restaurants, Theatres, Hotels, Lodge Halls, Stores, etc., are constantly looking for relief. Get your share of this business.

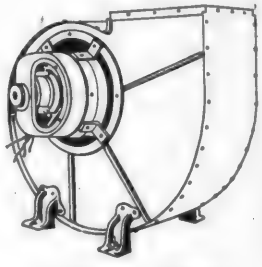
Ilg Self Cooled Motor Fans and Blowers are highly efficient in cramped and excessively heated spaces. Built in various sizes for all currents.

The exclusive patented "self cooling feature" of Ilg Propeller Fans can also be furnished for Ilg Universal Blowers.

Pocket Manuals and Literature on request.



Section View



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Direct Connected or Belted

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Branches in all large cities

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

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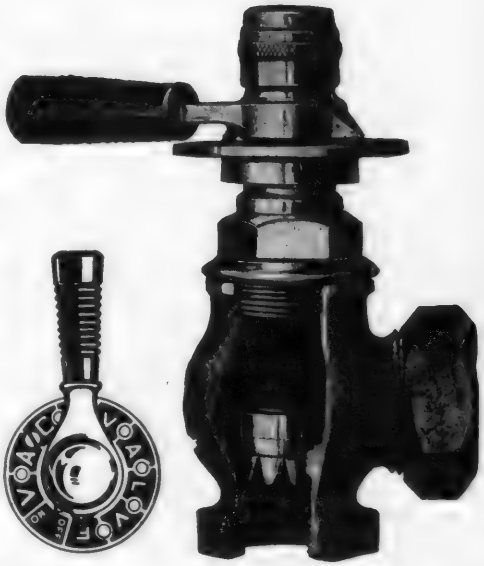
The Correct Radiator Valve for Vapor Heating

The Detroit Packless Vacu Valve is a Graduated Valve for Vapor and Vacuum Systems of Heating. The dial plate is provided with a series of holes and a movable pin. This pin acts as a stop for the handle pointer, and is inserted in the hole in the dial nearest the point at which the valve, when opened, admits only sufficient vapor or steam to fully supply the radiator.



DETROIT PACKLESS
Vacu Valve Showing Dial Plate and Lever Handle

Booklet VP-1 Gladly Sent Upon Request

DETROIT LUBRICATOR COMPANY
DETROIT, U. S. A.

LARGEST MANUFACTURERS OF RADIATOR VALVES IN THE WORLD

tary, Charles F. Waltz, Cincinnati. The constitution committee is composed of M. L. Crowell, Cleveland; O. J. Wheeler, Columbus; J. J. G. Geerin, Cincinnati; W. J. Scholl, Youngstown; J. W. Bryce, Toledo; William Haas, Dayton; and H. P. Cahill, Akron.

Eastern Supply Association, at its meeting in New York, June 11, gave unqualified approval to the Trade Extension movement. In his address of welcome President Evans said: "The period since the last meeting has not been altogether profitable, but it would be unwise to state that the immediate future will not show better results. The country has been at war. We prepared in a short time and we will prepare for peace-time activities quickly and make the necessary readjustments." Reports that their plants were operating at full capacity were made by A. M. Maddock, speaking for Thos. Maddock's Sons Co., and by H. E. Speakman, for Speakman & Co. George W. Collins, of the C. F. Church Mfg. Co., stated that business conditions in the West are rapidly improving.

McCann-Harrison Co., Cleveland, O., announces the appointment of G. D. Farnham as chief engineer of its power and heating department. Mr. Farnham was previously with the Westinghouse-Church-Kerr Co., of New York.

Building Operations for May, as reported for 164 cities by the *American Contractor*, continue the good showing of the previous months. The total was $105,470,299, a gain of 110% over last May's total of $49,763,085. Notable figures were returned by Akron, $2,926,090, a gain of 451%; Atlanta, Ga., $1,171,578, a gain of 121%; Baltimore, $2,680,637, a gain of 802%; Boston, $2,178,093, a gain of 139%; Chicago, $7,190,200, a gain of 91%; Cincinnati; $1,539,855, a gain of 92%; Cleveland, $3,378,375, a gain of 132%; Indianapolis, $1,156,091, a gain of 266%; Los Angeles, $2,078,295, a gain of 59%; Milwaukee, $2,024,640, a gain of 266%; Minneapolis, $1,270,750, a gain of 117%; Newark, $1,327,717, a gain of 95%; New York, $20,233,825, a gain of 194%; Omaha, $1,042,220, a gain of 106%; Philadelphia, $5,960,104, a gain of 256%; Pittsburgh, $1,426,214, a gain of 144%; San Diego, $1,045,015, a gain of 1307%; St. Paul, $1,713,234, a gain of 33%; St. Louis, $1,224,325; a gain of 54% and Washington, D. C., $1,648,609, a gain of 114%.

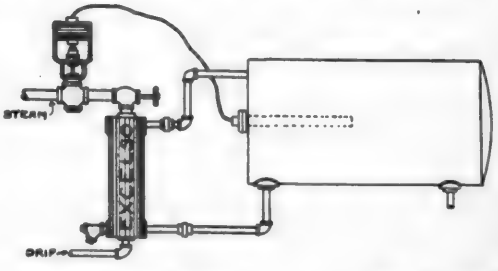
EXCELSO HEATERS FOR STORAGE TANKS

Large Heating Surface
Quick and Efficient

The Heater may be connected in many different ways to storage tanks and may be used with or without thermostatic control. It may also be used with or without the storage tank, either singly or in multiples with or without thermostatic control.

Sizes to fit all conditions

Send for new circular just out



EXCELSO SPECIALTY WORKS, 601 White Bldg., Buffalo, N. Y.

PIPE BENDING

MARINE EQUIPMENT AND REPAIR WORK
HEATING AND VENTILATING

THE OHIO HEATING AND PIPE BENDING CO.

Main Office and Factory, 1061-63 West 11th Street, Cleveland, Ohio

SOLE AGENTS FOR

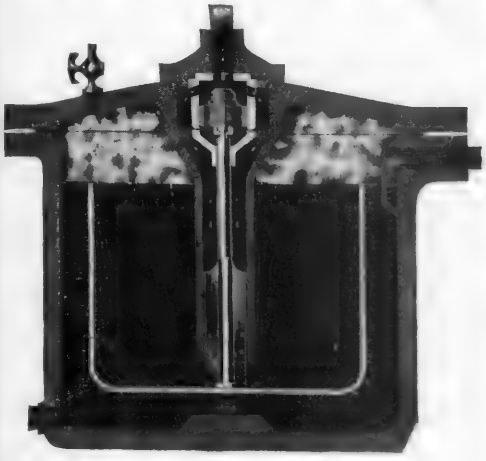
F. J. Nice Oil and Combination Oil and Gas Burners

Manufacturers' Notes.

Abendroth Bros., Portchester, N. Y., manufacturers of heating boilers and cast-iron products, has been acquired by new interests. The following directorate has been elected: President, Philip R. Mallory; vice-president, Clifford D. Mallory, treasurer, Frederick K. Leatherbee; secretary, Richard C. Hun; general manager, Frank E. Seeley; and Harral S. Tenney, president of the Greenwich Trust Company. Abendroth Bros. was established in 1840 and has long occupied a prominent position in the stove, boiler and soil pipe fields. It is the purpose of the new interests to develop still further the company's present line of products.

Bailey Meter Co., Cleveland, O., announces the election of E. A. Hitchcock as vice-president. Mr. Hitchcock will supervise the training of technical graduates for the company's service and sales departments. He was formerly professor of experimental engineering at the Ohio State University. During the past six years he has been connected with the E. W. Clark & Company Management Corporation as advisory, consulting and power sales engineer.

VANCE
Steam Trap

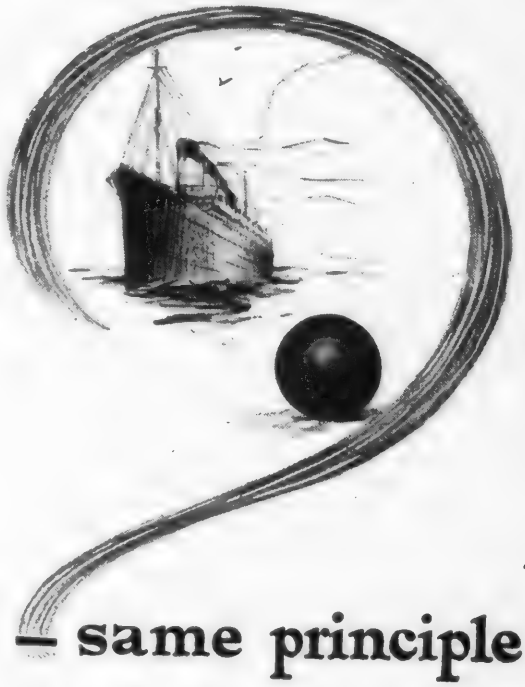


Low Pressure Style

Extra Large Discharge Valve

No Small Parts to Corrode and Stick

VANCE-VETTER CO., Pittsburgh, Pa.



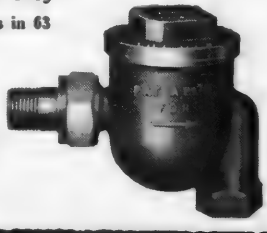
same principle

THE steel ship and this hollow metal ball taken from the Johns-Manville Radiator Trap have a principle in common. It is this buoyant ball with a constant water line (because its volume and weight are pre-determined) that makes this trap positive and faultless in operation.

Even solid freezes fail to damage this trap. Self-adjusting, easily cleaned, it is really unique among traps. And it is unique not only in design but in its five years' record on systems in all climates. The low installation cost of this trap is fast making it a leader among heating contractors everywhere.

Write any branch for a descriptive booklet and price list.

H. W. JOHNS-MANVILLE CO.
New York City
10 Factories—Branches in 63 Large Cities



Through—
Asbestos
and its allied products
BOILER
CEMENTS
ROOFINGS
PACKINGS
LININGS
FIRE PREVENTION PRODUCTS

JOHNS-MANVILLE
Radiator Trap

Borden Co., Warren, O., manufacturer of Beaver pipe tools, announces the opening of an office in the downtown district of Chicago at 549 West Washington Boulevard. Charles A. Greene is in charge.

Buffalo Forge Co., Buffalo, N. Y., announces that C. C. Cheney has returned to take charge of the company's Chicago office and store. Lieutenant Cheney was commissioned in the navy and had charge of the mechanical repair shops at the Naval Aviation Station at Pensacola, Fla., where from 600 to 1200 men were employed during the war. The company's interests in the St. Louis territory are now in charge of Captain H. H. Downes, 12th U. S. Engineers (Railway) who has recently returned from France. Captain Downes's regiment was one of the first to go across the water, sailing in July, 1917.

American Thermostat Co., Newark, N. J., has moved into its new general office and factory building at 226 Jelliff Avenue, in that city.

Advance Pump & Compressor Co., Battle Creek, Mich., manufacturers of the Advance line of condensation pumps, is building a $75,000 addition to its plant, including a foundry, 75 x 121 ft., of brick and steel construction; and a machine shop and pattern storage building 60 x 125 ft. A new power house, 30 ft. square, is also included in the addition.

Lord & Burnham Co., Irvington, N. Y., has appointed A. E. Bastaedo manager of the company's heating department.

American Radiator Co., Chicago, Ill., is building an extensive addition to its Springfield, Ohio, plant, which will be used as a warehouse. Later, it is stated, a machine shop and testing department will be added.

Mouat-Squires Co., Cleveland, O., has appointed W. H. Kelley as its representative in western Ohio. Mr. Kelley was previously Ohio representative for the National Radiator Company.

A. M. Byers Co., Pittsburgh, Pa., will build a $35,000 water-treating and filter plant at its Southside mills in Pittsburgh. T. L. Lewis, the company's general sales manager, has resigned from the company, effective July 1.

Ilg Electric Ventilating Co., Chicago, Ill., is building a modern two-story concrete factory comprising 100,000 sq. ft. of floor space at Crawford Avenue and George St.,

HOW TO SPECIFY

Webster Air Washers

Types "A" and "B"

WITH OR WITHOUT THE

Webster System of Humidity Control

Copy will be mailed on application and your name placed on our mailing list to receive additional bulletins as they are ready.

ATMOSPHERIC CONDITIONING CORPORATION

LAFAYETTE BUILDING

PHILADELPHIA

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

No Trouble to Take Humidity Readings with this Device

THE COMINS ELECTRO PSYCHROMETER

(Patented July 24, 1917)

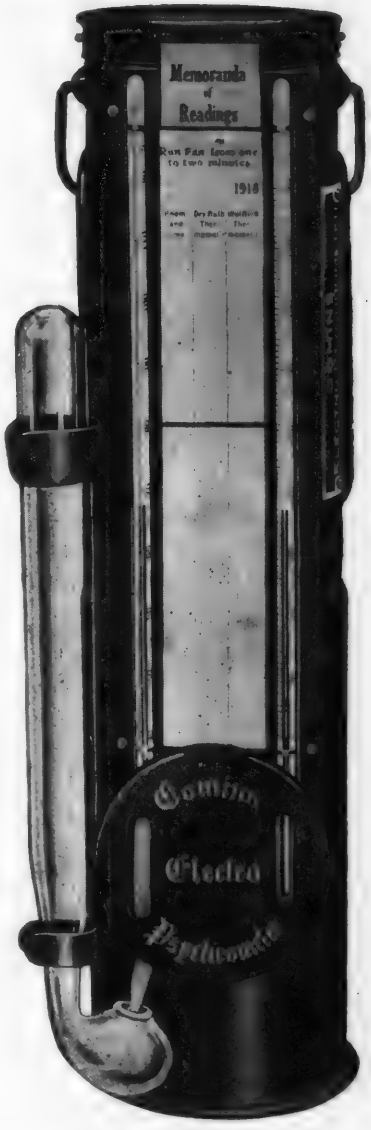
does not require the space needed for the whirling sling psychrometer. It is easily carried about, and accurate readings can be obtained in a minute or two in the most congested places, where the use of swinging instruments is impossible.

No special skill is required and the expense from breakage with the ordinary usage is practically done away with.

Especially constructed for long continuous running

Operates directly from any electric light or other current

Provided with a variable current motor which permits of "plugging in" at fixed stations where readings are regularly required at determined places.



Battery Type

Correspondence Invited

AMERICAN MOISTENING CO., 120 Franklin St., Boston, Mass.

We have been manufacturers of humidifying and kindred apparatus for over 28 years

Chicago. It is the first unit of what will be ultimately a multiple-unit plan. The factory will be located on a tract of about 10 acres and, with the land, will represent an investment of about $450,000. An announcement, recently made by the company, provides for the election of one member of the company's board of directors by the employees. The company now has a system whereby the workers have a large voice in the internal affairs of the concern. Some two years ago the workers, through the department heads, formed a welfare committee. At first it dealt with such things as come under the general heading of "welfare work." Gradually its field expanded until now it has been established as an advisory committee which is virtually a board of control, so far as the internal policy of the plant is concerned. It is composed of ten workers from the plant, known as department heads, and five men from the office, embracing secretary, vice-president, engineer, the production expert and the purchasing agent. When the company decided to build a new plant recently the board picked the plant and decided on the type of building and machinery. The company has long maintained a profit-sharing system.

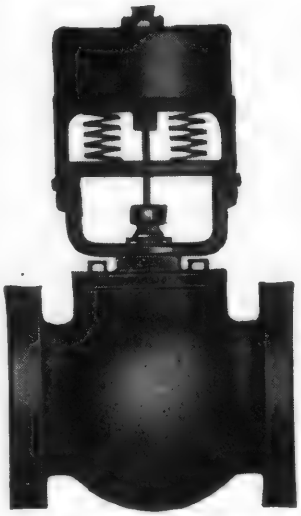
Belknap Hardware Mfg. Co., Louisville, Ky., has acquired the historic Galt House and adjoining property. The famous old hotel will be used as a warehouse in connection with the company's heating and plumbing supply business.

Barney Ventilating Fan Works, Boston, Mass., of which Albert B. Franklin, Inc., is the proprietor, as well as the heating and ventilating engineering and contracting firm of Albert B. Franklin, Inc., have removed their offices and factory to 25-27 Haverill Street, Boston.

Harrison Safety Boiler Works, Philadelphia, Pa., has acquired the Monash line of pressure-reducing valves and pump governors, formerly manufactured and sold by the Monash-Younker Co., Chicago, Ill. The purchase includes a stock of manufactured parts and valves, drawings, trade mark and good-will. The Harrison Safety Boiler Works will manufacture and market the valves under the name "Cochrane-Monash" and will supply repair parts for valves now in use.

American District Steam Co., North Tonawanda, N. Y., announces the resignation of Charles R. Bishop as treasurer and

What's Your Reputation Worth?



The Powers All-Metal Valve

Your reputation is always safe when you specify Powers equipment, because Powers Regulators—whether a system or a unit—are built with quality-thought first.

There is a Powers Regulator for every usual requirement in the automatic control of air and liquid temperatures. Because the basic Powers principle is *right*, a Powers regulator can be made adaptable to any unusual or difficult condition.

For over thirty years we have devoted all our energies to the problems of temperature regulation, and have gained a vast fund of experience which is at your service.

THE POWERS REGULATOR COMPANY

Specialists in Automatic Heat Control

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2143 Mallers Bldg., Chicago
365 The Federal Street Bldg., Boston

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Our experience in meeting the needs of an industrial nation is a part of the intrinsic value you receive in dealing with us.

Tycos Type Angle and Straight Stem Thermometers
Tycos Recording and Indicating Thermometers
Automatic Temperature and Pressure Regulators
Mercury Vacuum and Absolute Pressure Gauges
Engraved Stem Thermometers
Hygrometers, Hydrometers
Thermo-Electric and Radiation Pyrometers

Taylor Instrument Companies

Rochester, N. Y.

There's a Tycos or Taylor Thermometer for Every Purpose

Request Our Catalogues Today

general manager of the company. Mr. Bishop's retirement marks the termination of a service with this company extending over a period of 30 years. It is stated that he will go into other manufacturing lines. Mr. Bishop is succeeded as secretary by Hal. C. Kimbrough, formerly manager of the company's Chicago office.

National Air Cell Covering Co., Jersey City., N. J., has elected G. C. Hall secretary of the company. Mr. Hall has long been a familiar figure at conventions of the National District Heating Association where he has had charge of this company's exhibit booth. His promotion is looked upon as a recognition of his sales service for the company.

National Tube Co., Pittsburgh, Pa., will start operations shortly on the construction of a $25,000,000 plant at Gary, Ind.

Williamsport Radiator Co., Williamsport, Pa., has increased its capital stock from $200,000 to $350,000.

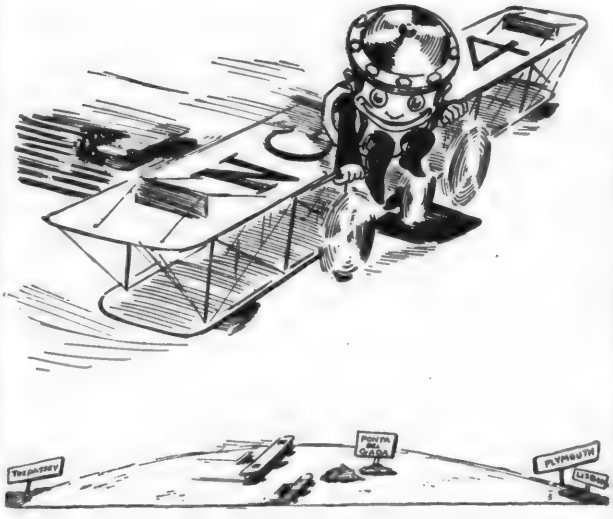
Central Station Heating Notes.

Kansas City, Mo.—In the total valuation submitted to the Missouri Public Utilities Commission, in connection with its request for a 7% return on its total investment, the Kansas City Light and Power Company put in several items that were the subject of sharp controversy at a recent hearing, including a value of $250,000 on the company's heating plant on Baltimore Avenue. This was contested by the auditors for the commission, as the records did not show any payment having been made for the heating franchise by the light company.

Logansport, Ind.—The future disposition of the Logansport Heat and Power Company's plant was to be determined at a sale of the plant early in July. Receiver Kistler stated that it was the purpose of the management to give the patrons of the company ample time to make arangements for heat this coming winter after the date of sale of the plant.

Pekin, Ill.—The public utilities commission has re-suspended the heating rates in Pekin until November 14. This means that the old rates will be in force until that date. Prior to this ruling, an order had been entered granting the local light and heat company an increase in its rates. The re-suspension followed protests on the part of citizens and the city of Pekin.

San Francisco, Cal.—A law has been



Mechanical Weather for Airplanes!

The Secret of the NC-4

The three Naval Seaplanes, NC-1, NC-3, and NC-4, left Trepassey Bay, Newfoundland, together. Apparently each one had an equal chance of accomplishing the First Trans-Atlantic Flight.

But only the NC-4 got across!

And, of the three, the NC-4 was the only plane machine-built according to progressive and typically American standards. She was built at the Naval Aircraft Factory, League Island, where Uncle Sam has proven to the world that even so delicate and intricate a thing as a seaplane can be machine-built in large quantities.

It was *Mechanical Weather* which made it possible for Uncle Sam to prove his point. The immense factory at League Island is equipped thruout with Carrier Air Conditioning Apparatus which automatically maintains a uniform condition of temperature and humidity, so that every machine-cut tenon, machine-cut perhaps weeks in advance, fits every machine-cut mortise, whenever assembled, and every square inch of fabric, stretched taut over the wings and fuselage, clings smooth and fast to the wood, because there is neither shrinkage nor stretch in the mechanically controlled atmosphere of the shops.

That is the secret of the NC-4.

If you could *manufacture* the weather in *your* plant it might enable you to cross *your* ocean of difficulties.

Bulletin 100-V tells the story of Manufactured Weather. It's yours for the asking.

Write right now

Carrier Engineering Corporation

"EVERY DAY A *GOOD* DAY"

39 Cortlandt St., New York, N. Y. BOSTON BUFFALO CHICAGO, ILL. PHILADELPHIA

Economy

Recirculated heat means a saving in the coal pile.

Buffalo Fan systems put heat mechanically just where it is wanted. They produce a slight plenum within the building which keeps the cold air out.

Buffalo Heating and Ventilating Apparatus

is no higher in first cost and their upkeep is offset by the saving in heat and the increased efficiency of the workers.

Write for catalog 198-36. It gives valuable engineering data in heating and ventilating problems.

BUFFALO FORGE COMPANY, Buffalo, N. Y.

New York Boston Philadelphia Pittsburgh Cleveland
Chicago Los Angeles

passed in California and has received the signature of Governor Stephens placing corporations and concerns furnishing heat to buildings in the same class as public utilities, under the jurisdiction of the Railroad Commission. Hereafter, in that State, heating charges and the adjunct of the service, will be fixed by the Railroad Commission, which already regulates the charges for water, light, power, telephone service and similar utilities.

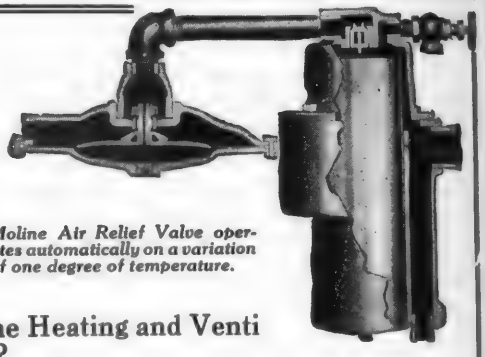
Belvidere, Ill.—As the Northern Utilities Company was not permitted by the State Utilities Board to discontinue its heating plant at the end of the recent heating season, the company has set June 1, 1920, as the date for the discontinuance of the service.

Hastings, Neb.—A municipally-owned and controlled heating plant for Hastings will be proposed to the city council, following resolutions favoring the project adopted by business men. The estimated cost of the plant is $120,000.

Watertown, S. D.—Plans for a central heating plant in Watertown have progressed to the point where a committee of four has been appointed by the Chamber of Commerce to co-operate with the city council in studying the project. According to a rough estimate submitted to the Chamber of Commerce by E. A. Larsen, of St. Paul, Minn., a central heating plant to serve the needs of the city, heat the new junior and senior high schools and central grade school, the centrally located churches, court house, library, city hall and a number of apartment houses, would cost $140,000. He said the central grouping of the business district and the contour of the land on which the city is built are ideal for the maximum return on an investment in a central heating system.

Fowler, Ind.—The heating problem of Fowler has been settled for another year, the Interstate Public Service Company having agreed to continue its service next winter. At the end of the year the company agrees to sell the heating mains to the town at an acceptable price. The Fowler merchants intend to build their own central heating plant to obviate the necessity of installing individual heating plants. The Interstate company has had a petition before the State utilities commission asking that it be permitted to abandon its heating system. There are 43 different buildings in the town that use central heat, 26 of which are business buildings.

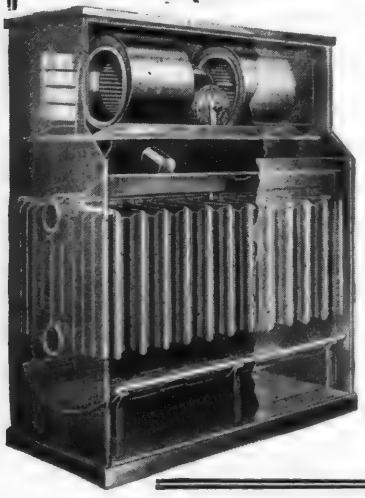
Are *you* a high-class sales representative?



Moline Air Relief Valve operates automatically on a variation of one degree of temperature.

The UNIVENT

"LIVE OUTDOORS—INDOORS"



Are you a Manufacturers' Sales Agent?

Do you know the Heating and Ventilating Business?

Do you know the Trade and Architects in your territory?

Have you full confidence in your ability to sell a good product?

IF SO—

we have a plan whereby you can earn more than you ever earned before, besides establish a business for yourself.

It will pay you to get in touch with us immediately, while there is some very good territory open for the sale of Moline Heat and the Univent.

Moline Heat EVERYWHERE

Moline Illinois

THE UNIT HEATER

was first placed in use in 1870 by B. F. Sturtevant, founder of the B. F. STURTEVANT COMPANY. Since that time, through careful study and engineering pratice, the present day Portable Unit Heater has been perfected. It is just one of the large and growing family of

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(REG. U.S.PAT. OFF.)

Independent Unit Heater

Its relation to the heating of shops and factories is similar to replacement of the old line shafting, by the unit motor drive.

It eliminates expensive, cumbersome overhead piping; it warms just the portion you wish heated; the exhaust steam from the small turbine, driving the disc or propeller fan, heats the steam coils. Its economy is apparent, and its efficiency has been proven.

The following are typical users:

HYDRAULIC PRESSED STEEL CO. CLEVELAND WINDOW GLASS CO.
AMERICAN LOCOMOTIVE CO. (5 plants) SCOVILLE MFG. CO.
BATES MACHINE CO. MERRILL SILK CO.

Our Engineering Staff, with the benefit of this fifty years of experience is at your service. Estimates given without obligation.

B. F. STURTEVANT COMPANY

Hyde Park, Boston, Mass., U. S. A.

AND ALL PRINCIPAL CITIES

Colorado Springs, Col.—Dismantling the heat plant of the Colorado Springs Light, Heat & Power Company is under way, a large part of the equipment being transferred to the gas works of the company.

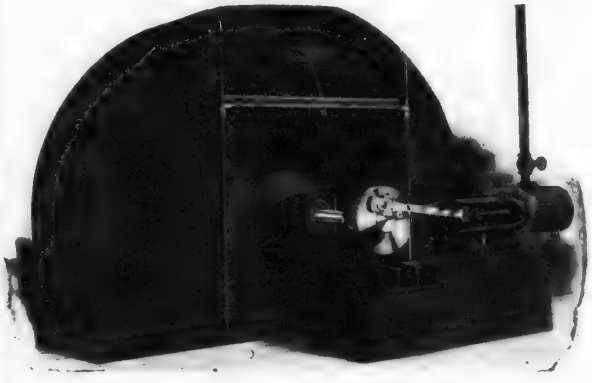
Springfield, Ill.—Negotiations are under way to have the city commissioners of Springfield take over the heating and lighting plants of the Springfield, Light, Gas & Power Company. Springfield now has a municipal plant that serves about one-third of the electricity users of the city. The value of the heating department of the company is causing a hitch in the negotiations. It is known that to rehabilitate the equipment and establish a plant to operate the business will require the expenditure of a considerable amount of money. Pending the completion of the sale, a survey was made by a representative of Lewis & Capron, engineers, of Chicago, regarding the cost of a new heating system. Whether the city puts in a new heating system or the utilities company should retain its franchise and rejuvenate its heating plant, it is felt that quick action is necessary, before the downtown pavements are relaid.

Toledo, O.—Toledo Railways & Light Company reports a number of changes in its personnel, one of the most important being the transfer of A. C. Rogers from his position as superintendent of the heating department to take up special duties under the assistant general manager. William Long, superintendent of production and the man given credit for keeping the Water Street power house in operation during the big flood of two winters ago, has been made New York representative in charge of special work in connection with all electrical production plants of Henry L. Doherty & Co., in Ohio. J. M. Strike, who has been with the company for years, is the new superintendent of production. Fred McKenzie has been named chief engineer of the heating stations and J. E. Craven has been appointed results engineer of the heating department. A. L. Rider succeeds Mr. Rogers as superintendent of the company's heating department.

New Incorporations.

Standard Heating Co., an Illinois corporation, qualified to do business in Indiana, where $25,000 of its capital stock is represented. The company manufactures warm air heating apparatus. Ralph E. Knoll, Greencastle, is named as agent.

Heating Ventilation
Drying Air Washers
Engines Mechanical Draft



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WORKS:
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The Hotel Winton

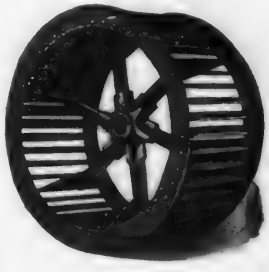
Max H. Dunning
Architect

ANOTHER HOTEL EQUIPPED WITH MASSACHUSETTS FANS

Eleven Massachusetts Fans, moving 212,200 cubic feet of air per minute, furnish perfect ventilation at the Hotel Winton, Cleveland.

The co-operation of our engineering department and the benefit of our experience may be had by any architect or builder whose plans include a problem in ventilation.

Condensed Bulletin of Fans, Blowers, Heaters, Etc. Sent Free on Request



MASSACHUSETTS BLOWER COMPANY
WATERTOWN·MASS·

NEW YORK BOSTON CHICAGO

Branches in 20 Principal Cities throughout the Country

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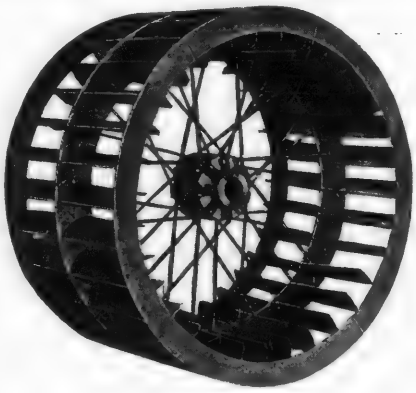

Bayley

Plexiform Fans

Strong, light, highly efficient, quiet in operation. Deliver maximum quantity of air from minimum of housing. Equally well suited to high and low pressures. Furnished in both double and single widths. *Our engineers will gladly help you solve your heating and ventilating problems.*

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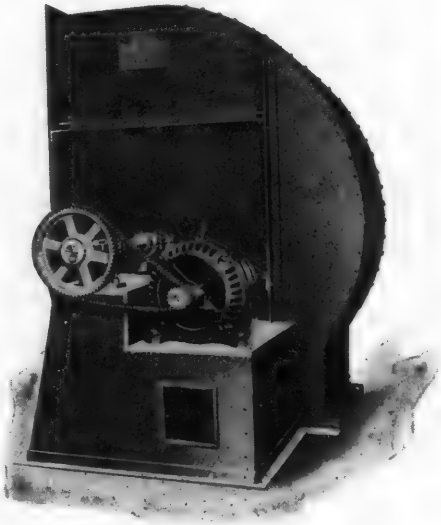
Bayley Mfg. Co.

Milwaukee, Wis.



American Plumbing & Heating Mfg. Co., East St. Louis, Ill., capital $15,000 to conduct "general construction work." Incorporators: P. W. Meeker, D. G. Wuersch and Frank M. Miller.

American Engineering & Construction Co., Wilmington, Del., capital $150,000, to manufacture, generate, buy, sell and deal in and with light, heat and power plants. Incorporators: T. L. Croteau, P. B. Drew, C. L. Rimlinger, all of Wilmington.

Phelps Light & Power Co., Rock Island, Ill., capital $800,000, to install light, heating and power plants. Incorporators: R. V. Phelps, Rock Island; H. C. Thompson and A. G. Bush, both of Davenport, Ia.

Lewis Heater Corporation, Utica, N. Y., capital $150,000, to manufacture heating apparatus. Incorporators: A. B. Maynard, Rothstein and A. K. McCluney.

Iowa Radiator Co., Cedar Rapids, Ia., has changed its name to the Chandler Heater Company and has increased its capital stock $150,000. The company remains under the same management.

Tucker & Gallagher Co., Worcester, Mass., capital $5,000, to take over the

BI-CAL-KY Ventilators

No power bills with this fan. The air that passes over your building furnishes the power to ventilate it.

We Guarantee Results

Write for information

BICALKY FAN CO.
Buffalo, N. Y.

RIC-WIL Paint for Heated Surfaces

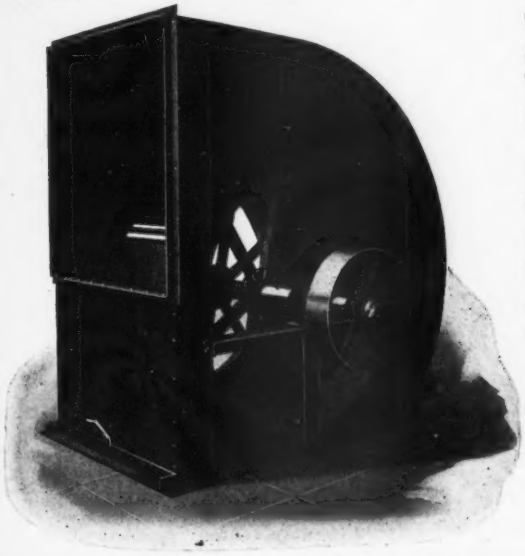
A brilliant black paint of superior preservative properties, dries hard yet is tough and elastic. It has a bond with clean metal that preserves its adhesion during contraction, expansion and bending.

Lasts Much Longer than the Average Coating.
Especially Good for Underground Heating Pipes.
Let us send You a Free Sample to Test.

THE RIC-WIL COMPANY, Cleveland, O.

Buckeye Multiblade Fans

are made especially for low pressure Heating and Ventilating work. They are giving perfect satisfaction.



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Our Engineering Department is maintained for the purpose of assisting Engineers, Architects, etc., in planning efficient Heating and Ventilating Systems for all buildings.

THIS DEPARTMENT IS FREE TO YOU.

We also manufacture a complete line of Disc, Cone and Steel Plate Fans.

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BUCKEYE BLOWER CO.

COLUMBUS, OHIO.

GARDEN CITY CYCLOIDAL MULTIVANE FANS

Cycloidal MULTIVANE FANS TRADE MARK

Efficient and Durable

Perfected after 35 years' experience in manufacture of Fans and Blowers of every description.

Send in your name for our new ***"Multivane Bulletin"*** containing full data on construction and performance of all sizes.

GARDEN CITY FAN CO.

Established 1879

McCormick Bldg. CHICAGO, ILL.

L. J. WING MFG. CO., New York City, Est. Rep's

heating and plumbing business of George T. Tucker. President, James F. Gallagher; treasurer and general manager, George T. Tucker.

International Valve and Piping Co., Pittsburgh, Pa., capital $100,000, to manufacture valves, fittings, piping, etc. Incorporators: Benjamin F. Harris, H. D. Wilson and R. J. Wilson.

Ideal Regulator and Coal Saver Co. of New England, Boston, Mass., to manufacture heating specialties. Incorporators: Charles H. Ackhardt, Harold P. Williams and R. F. Hallahan.

New Firms and Business Changes.

Griggs & Meyers, consulting engineers, New York, announce their recent affiliation with Charles A. Fuller, heating engineer, of New York, and Osborn Monnett, heating engineer, of Chicago, as associates. Mr. Fuller is a well-known specialist in heating and ventilation, while Mr. Monnett enjoys a wide reputation in the field of combustion and power plant economics. The principals of the firm are John S. Griggs, Jr. and David Moffatt Myers.

Frank X. Baird, formerly a representative of Keasbey & Mattison Co., on contract work for asbestos and magnesia insulation, has engaged in the pipe covering business on his own account, with offices at 308 West 26th Street, New York. Mr. Baird will handle asbestos materials, as well as pipe covering contracts.

WANTED.

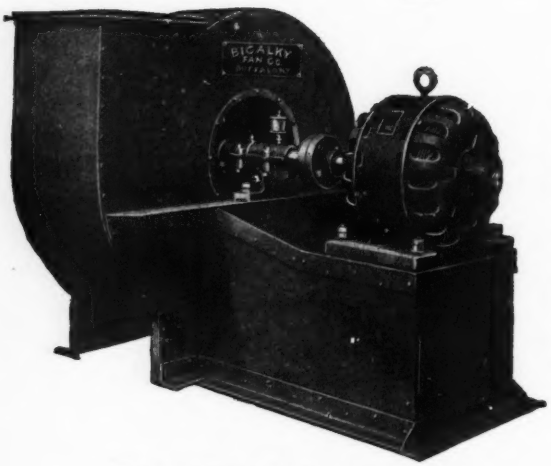
Engineer Wanted—Engineer wanted, experienced in fan, blower, heating and ventilating engineering. State age, experience and salary expected. Address Blower, Box

GOLD'S THERMOSTATIC HEAT REGULATING SYSTEM

Operated entirely by ELECTRICITY.
Each room is a unit by itself.
Does not depend on an air compressor.
Requires no attention whatever.
Is free from all troubles which usually affect such devices.

GOLD CAR HEATING AND LIGHTING CO.
17 Battery Pl. (Whitehall Bldg.) New York

BI-CAL-KY



BI-CAL-KY FANS ARE GOOD

WE wish to announce to the former customers of the Bicalky Fan Company of Buffalo, N. Y., and to the trade in general, that we have purchased the business of the Bicalky Fan Company.

It is our intention to continue the manufacture of this product in the careful manner of our predecessors and to render at all times engineering data to assist our customers in the sale and in the installation of Bicalky Fans, Air Washers, Dust Collectors, Dust Arresters, and Roof Ventilators.

On our staff of engineers, we have retained Mr. C. H. Bicalky, who will also take care of our interests in Buffalo.

We solicit your inquiries and assure you of our co-operation.

HERSH & BROTHER

Main Office and Factory
Allentown, Pa.

951 Niagara St. Buffalo, N. Y. **Perry Bldg. Philadelphia, Pa.**

Is Merchandise Properly *SOLD* to You?

YOU recognize the direct connection between production methods and the cost and quality of the goods; you have a right to know that goods are properly made. Yet the manufacturing, important though it is, is but the first lap on the journey to the consumer. Merchandise must be sold; sales cost is just as legitimate as manufacturing cost, and it has *just as direct a bearing upon the final cost to you.* If needless expense is incurred, it means either higher prices or a decrease in quality or service.

Obviously it will pay you to recognize efficient selling service. With this simple truth clearly in mind, permit us to enunciate an established, proven sales principle—

—The seller who advertises in the Business Papers reaching *only* the class interested in his message, is using the most direct and economical method of helping you maintain an intelligent contact with your sources of supply.

This kind of advertising bears the same relation to the sales department that an improved machine does to the production department. And if the sales methods are wasteless and efficient, you seldom need worry about the goods. Each acts as a support and stimulus for the other.

On the other hand, the practice of buying circulation by the million in the hope of influencing a few thousand possible customers, is open to question. The best machine is a source of waste when improperly used, and this is no reflection on the machine. Concentration beats scatteration, and costs less. The right tool in the right place is a principle of as much importance to selling as to production.

There are many other reasons why discriminating buyers are giving preferred consideration to the concerns which tell them their business story in the buyer's own business paper, *especially* if that paper has subscribed to the high standards of practice of The Associated Business Papers, Inc.

LIST OF MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in their editorial and advertising service.

Advertising and Selling
American Architect
American Blacksmith
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint and Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile Dealer and Repairer
Automotive Industries

Boot and Shoe Recorder
Brick and Clay Record
Buildings and Building Management
Bulletin of Pharmacy

Canadian Grocer
Canadian Railway and Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothier and Furnisher
Coal Age
Coal Trade Journal
Concrete
Cotton

Daily Iron Trade & Metal Market Report
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter

Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical Review
Electrical World
Embalmer's Monthly
Engineering World
Engineering and Mining Journal
Engineering News-Record

Factory
Farm Machinery—Farm Power
Foundry (The)
Furniture Manufacturer and Artisan
Furniture Merchants' Trade Journal

Gas Age
Gas Record
Grand Rapids Furniture Record

LIST OF MEMBERS
(Continued)

Haberdasher
Hardware Age
Heating and Ventilating Magazine
Hide and Leather
Hotel Monthly

Illustrated Milliner
Implement and Tractor Age
Industrial Arts Magazine
Inland Printer
Iron Age
Iron Trade Review

Lumber Trade Journal
Lumber World Review

Manufacturers' Record
Manufacturing Jeweler
Marine Engineering
Marine Review
Metal Worker, Plumber and Steam Fitter
Mining and Scientific Press
Modern Hospital
Motor Age
Motorcycle and Bicycle Illustrated
Motor World

National Builder
National Druggist
National Petroleum News
Nautical Gazette
Northwestern Druggist

Power
Power Boating
Power Plant Engineering
Price Current—Grain Reporter

Railway Age
Railway Electrical Engineer
Railway Maintenance Engineer
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rubber Age

Shoe Findings
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Southern Hardware and Implement Journal
Sporting Goods Dealer
Starchroom Laundry Journal

Tea and Coffee Trade Journal
Textile World Journal
Timberman
Transfer and Storage

Woodworker

THE ASSOCIATED BUSINESS PAPERS, Inc.,

JESSE H. NEAL,
Executive Secretary

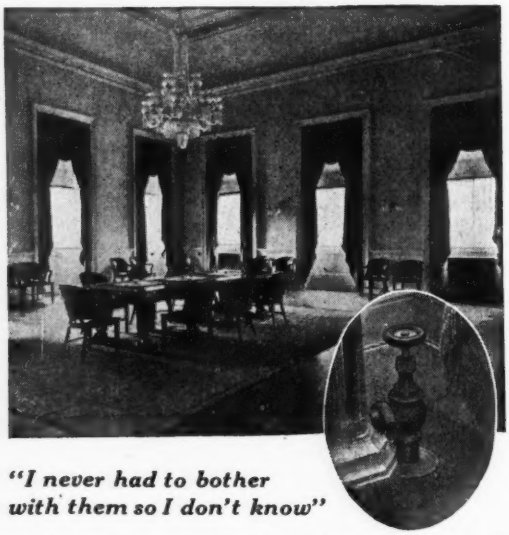
HEADQUARTERS: 220 West 42nd Street, NEW YORK CITY

25, care of Heating and Ventilating Magazine.

Wanted—Experienced heating engineer and estimator. State experience, salary wanted and any references that you can give. Address Manager, Box 14, care of Heating and Ventilating Magazine.

Engineering Salesman Wanted.—Engineering salesman acquainted with architects, heating engineers and contractors, wanted to handle a complete line of vacuum, vapor, low and high-pressure steam heating and power plant specialties. Specify territory you can cover. Address Manufacturer, Box 25, care of Heating and Ventilating Magazine.

Wanted.—Manufacturers' agent in New York territory can take on one or two more accounts for responsible manufacturers of approved heating specialties. Knows the New York field thoroughly. Years of experience as sales manager for metropolitan district for leading large heating maufacturing concern. Address Metropolitan, care of Heating and Ventilating Magazine.



"I never had to bother with them so I don't know"

said the custodian of New York's City Hall when asked if the radiator valves in the building were Jenkins.

Of course, after investigation, they proved to be genuine Jenkins Valves—the same valves that were installed ten years ago.

In explanation, the custodian said the radiator valves were the "least of his troubles," and that the reason he didn't know the make was because he never had had occasion to fix them.

That's the story of Jenkins Valves in a few words—they are "trouble-free" because they are made that way.

JENKINS BROS.

New York Boston Philadelphia Chicago Montreal London

Jenkins Valves

Hot Water

When installing hot water systems for workers' welfare *be sure* the heater is properly proportioned for **all** demands.

Not only for the *frequent* demands of lavatories, etc., but also for the **volume** required *almost instantly*, in showers and washing-up.

A supply for all. Not '*first* come first served' only, but the *last* man served as well.

Patterson Storage Heaters

(*installed in accordance with our 39 years' experience as hot water engineers*) are guaranteed to **do it** positively without wasting steam or 'priming' the boiler.

Built in any capacity for from

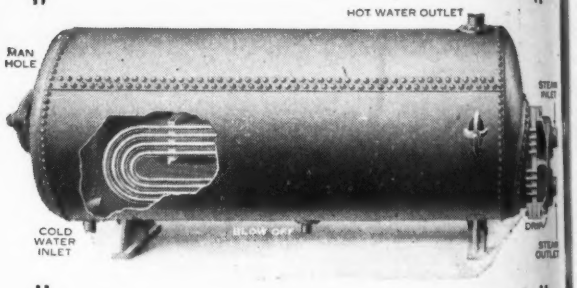
1 to 1000

showers and sinks

and for steam at any pressure.

and—you know
a **Patterson** installation is a pretty good one to refer to.

Let us assist you



The Patterson-Kelley Co.

23 Dey St. New York